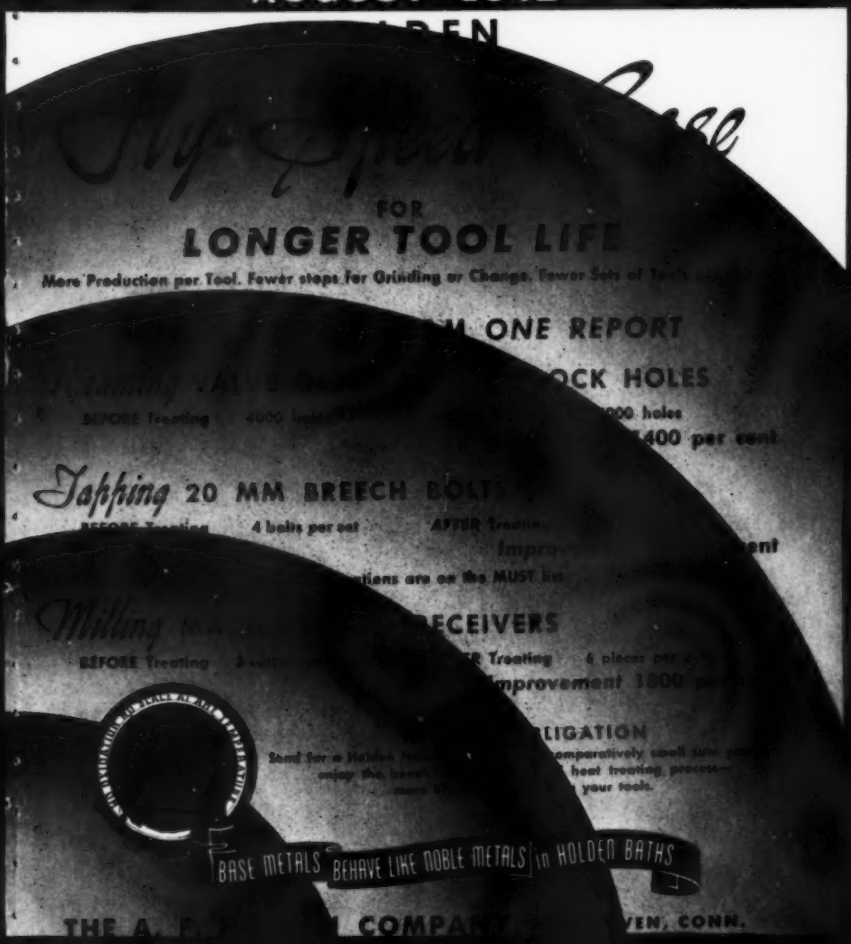
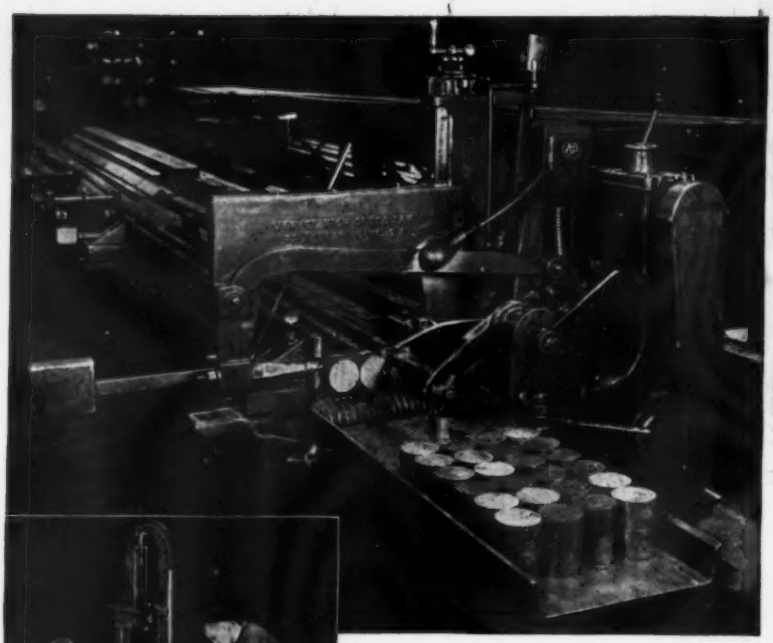
MACHINE TOOL BLUE BOOK

AUGUST 1942





• *No. 9A MARVEL Production Saw automatically cutting-off quantity run—3 bars at a time. This heavy-duty all-ball-bearing machine cannot be surpassed in speed, simplicity, ruggedness and dependability.*

• *A Universal No. 8 MARVEL Metal-cutting Band Saw that cuts-off, miters, notches or cuts at any angle from 45° right to 45° left. Blade feeds into the work.*

MARVEL SAWS handle orders as they come, at Jones & Laughlin Warehouse

Hot rolled and cold finished steel squares, rounds, hexagons and flats,—single pieces or hundreds of pieces, lengths or slices, small bars or large (to 18"x18") are cut-off quickly, accurately and efficiently at the Jones & Laughlin Steel Corp. Detroit Warehouse with MARVEL SAWS. "We are very pleased with all machines" sums up their MARVEL experience.

MARVEL SAWS

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave. Chicago, U.S.A.

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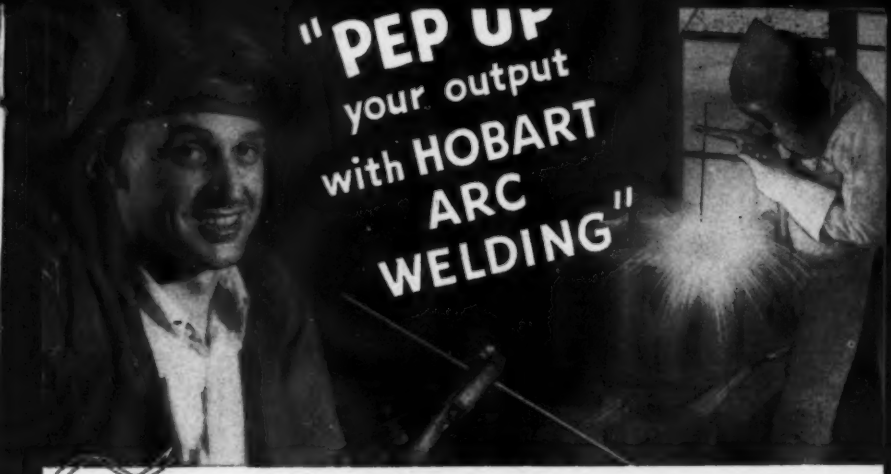

A Vital Tool in Today's Production for Victory

● Arc welding is playing a big role in today's drama . . . and Hobart "Simplified" Arc Welding is the star of the cast. It's cutting corners all along the production line, because of its "ten-years-ahead" features. It's eliminating bottlenecks and keeping 'em rolling when used for maintenance and repair, and it's saving valuable metals by salvaging broken parts, correcting mistakes. It's saving operators, too, because it's "Simplified." Hobart can help you speed your war effort. Use the coupon.

HOBART BROS. CO., Box TB-82 Troy, O

HOBART "Simplified" ARC WELDERS

★ ***EXCLUSIVE REMOTE CONTROL*** *saves time, lessons fatigue, lets operator select exact "heat" any distance from machine.*

New Arc Welding Book

ON LATEST TECHNIQUES, PROCEDURES, MATERIALS AND EQUIPMENT...

A complete volume on metal-joining. 516 pages, 512 illustrations. Charts, diagrams, tables and easy-to-read text. It's up-to-the-minute with information. 5 Days Inspection Trial. Order today.

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Send information on items checked:

☐ Electric Drive Welder ☐ Gas Drive Welder

Also send _____ copies of "Practical Arc Welding" at $2 per copy. ☐ Check ☐ C.O.D. (Plus Postage)

NAME _____

FIRM _____

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"One of the World's Largest Builders of Arc Welders and Equipment."

EMPLOY THE UNSKILLED To Cut Perfect Threads

RIVETT THREAD TOOL

There is an army of unskilled operators ready to cut perfect threads with the Rivett Thread Tool. Not new, but proven, this tool helped win the last war and is again ready to throw its weight into Victory Production.

The Rivett Thread Tool is an attachment for any screw cutting engine lathe, and takes the place of single point thread tools commonly used. The tool is a holder for a ten tooth cutter with means for indexing the cutter to present each of the ten teeth progressively to the work. The first nine teeth rough out the thread in nine heavy, measured cuts, the tenth tooth finishes the thread. The responsibility of the operator is reduced to indexing the cutter when reversing the lathe. The thread tool does the rest.

Descriptive bulletin and ordering instructions are available on request.

RIVETT LATHE & GRINDER INC
BRIGHTON BOSTON, MASS.

Fast, accurate, dependable . . .

Fast, accurate, dependable . . . these three words are constantly mentioned when users state their experience with HARDINGE High Speed Precision Milling Machines.

Ruggedness is combined with extreme accuracy for ease of operation . . . high spindle speeds insure better finish as they afford proper cutting conditions.

Ask for our latest bulletin giving complete details.

"Performance has established leadership for HARDINGE"

SPECIFICATIONS:
Table, 25" x 6-1/2".
8 Speeds: 110 to 1850 R.P.M.
Cutter and Index Head have 1" Collet Capacity

HARDINGE

HARDINGE BROTHERS INC., ELMIRA, N.Y., U.S.A.

ARMSTRONG

You can "eat your cake* and have it too" with ARMSTRONG TOOL HOLDERS

(*High Speed Steel)

Take the high speed steel needed to make a forged tool for any operation on lathes, planers and shapers —by using an ARMSTRONG TOOL HOLDER for that operation you can have the same high speed cutting point *and still have 90% of your high speed steel left over for other work.*

In ARMSTRONG TOOL HOLDERS each ounce of high speed steel will do the work of 10 ounces in a bar tool. And, every ARMSTRONG TOOL HOLDER is a permanent, multi-purpose tool that effectively replaces a complete set of forged tools. With each ARMSTRONG TOOL HOLDER a more efficient tool can be forged—a handier tool, with exactly correct cutting angles and approach angles, a more rigid, more accurate tool with strength to stand up to any speed or feed that a machine tool can attain. It is utter waste to forge tools for standard operations, especially today.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

308 N. Francisco Ave. Chicago, U.S.A.

Eastern Warehouse and Sales
199 LAFAYETTE ST., NEW YORK

Machine Tool Blue Book

Hitchcock Publishing Co., 508 So. Dearborn St., Chicago

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A Sap-Hole at 12 Rods-

IN 1838 Dr. Story of West Parish, Windsor, Vermont, gave his nephew, young Dick Lawrence, permission to recondition the doctor's old squirrel rifle and mount a peep sight on it. When the job was finished they tested the rifle by firing three shots at a ¾" sap hole in a maple 12 rods away. Finding no new bullet holes in the tree trunk, the indignant doctor thought his rifle had been ruined — until he discovered to his amazement that all three bullets were in the sap hole itself! Thus Richard Lawrence won his first opportunity to rise to leadership in the gun shop of Nicainor Kendall, early direct predecessor of the modern **Jones & Lamson Machine Company.**

Jones & Lamson 12" x 81" Fay Automatic Lathe tooled to machine an aircraft cannon.

AUTOMATIC THREAD GRINDERS

OPTICAL COMPARATORS

RAM TYPE UNIVERSAL TURRET LATHE

or a Tank at Half-a-Mile

In 1838 it may have been quite a feat to turn out a rifle that would put three bullets in a sap hole at 12 rods, but today's emergency demands accurate machine gun fire at 1500 yards, cannon that can hit a fast moving tank over half a mile away and antiaircraft guns that destroy five-mile-a-minute targets at 20,000 feet.

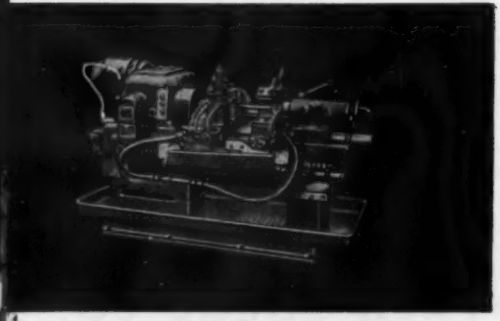
In any day and time, the technique of producing weapons that hit precisely where you aim them demands similar fundamentals of machine tool engineering and workmanship. Just as Lawrence understood those fundamentals and applied them in his generation, so did Robbins, Hubbard, Howe, Lamson, Hartness and scores of other engineers in Jones & Lamson Machine Company and its predecessor shops.

So do present day Jones & Lamson engineers design equipment that sets new standards of speed and accuracy today. Such are the Jones & Lamson Fay Automatic Lathes, pictured here on multiple tooled precision work on weapon barrels, capable also of cutting costs on peace-time tasks like shafts and spindles.

Here is another timely example of why it pays two ways to put production problems up to Jones & Lamson engineers. Why not see what they can do to help you? Inquiries from large plants or small receive thorough study here.

JONES & LAMSON

MACHINE COMPANY • Springfield, Vermont, U. S. A.



Jones & Lamson 8" x 33" Fay Automatic Lathe tooled to machine an automatic rifle barrel.

Manufacturers of Ram & Saddle Type Universal Turret Lathes . . . Fay Automatic Lathes . . . Automatic Thread Grinding Machines . . . Comparators . . . Automatic Opening Threading Dies and Chasers

PROFIT PRODUCING MACHINE TOOLS

Bring on
THOSE EMERGENCY DEMANDS

"Buffalo"

PRODUCTION DRILLS

. . . turn out the work faster because they're "geared" to the operator. Yes, they fit the man at the controls, because all Buffalo Drill Controls are at his finger tips. That makes *him* more efficient on today's war production assignments. Built down to the smallest detail for fast, dependable output, Buffalo Production Drills are ably qualified to fulfill any emergency demand on a 24-hour-a-day schedule!

BUFFALO FORGE CO.
161 Mortimer St. Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo" **DRILLING MACHINES**

THE CLAMP'S THE THING

. . . IT MEANS *FASTER, EASIER RESETTING OF BLADES ON CONTINENTAL MILLING CUTTER*

Two blades of the rugged Continental Face Milling Cutter are unclamped at one time by a twist of an Allen wrench. A slight tap then unseats the tapered blade for adjustment. A screw and a clamp hold blades in place . . . the blades can be adjusted without removal from the cutter. There are no screw threads in the cutter body to wear out. Ample clearance is provided at bottom of each blade slot to insure perfect seat throughout the life of the cutter. This cutter meets today's needs exactly.

Note simple and effective clamp used on Ex-Cell-O Face Milling Cutter. Each clamp locks two blades quickly and securely.

EX-CELL-O
CORPORATION
DETROIT, MICHIGAN

CONTINENTAL
Inserted Blade
FACE MILLING CUTTER

Precision THREAD GRINDING, BORING AND LAPPING MACHINES, TOOL GRINDERS, HYDRAULIC POWER UNITS, GRINDING SPINDLES, BROACHES, CUTTING TOOLS, DIESEL FUEL INJECTION EQUIPMENT, R. R. PINS AND BUSHINGS, DRILL JIG BUSHINGS, PARTS

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EX-CELL-O means PRECISION

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RADIAL DRILLS

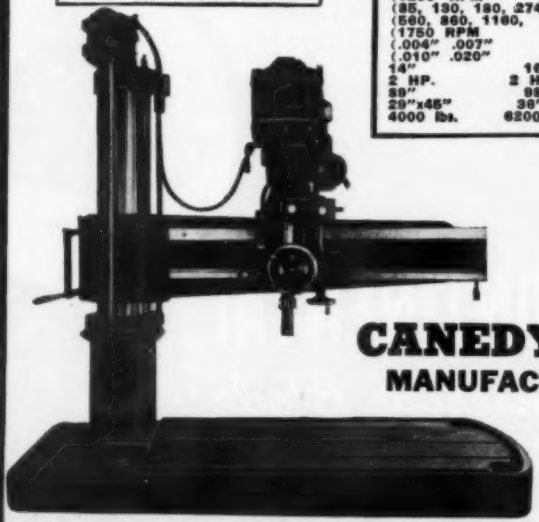
Canedy-Otto has been the manufacturer of first-class, high-grade drilling units since 1892. These units are available in single spindle, multiple spindle and radial.

We can help you solve your drilling problems. Send for information on our complete line.

USED THE WORLD OVER

SPECIFICATIONS:

	9" Column 3' Arm	11" Column 4' Arm	11" Column 5' Arm
Drills to the center of circle on base or table	73½"	96"	120"
Length of arm	3'	4'	5'
Greatest distance from spindle to base	43½"	48"	48"
Minimum distance from spindle to base	9½"	15"	17"
Minimum distance from spindle to column	10½"	10"	10"
Traverse of spindle	9½"	9½"	9½"
Hole in spindle—Morse Taper	No. 4	No. 4	No. 4
Diameter of spindle at nose	2½"	2½"	2½"
Traverse of head on arm	25½"	36½"	48½"
Traverse of arm on column	21½"	24"	32"
Spindle speeds with 1200 RPM motor	(60, 85, 130, 180, (425, 560, 860, (1200 RPM		on all models
Spindle speeds with 1800 RPM motor	(85, 130, 180, 274, (560, 860, 1180, (1750 RPM		on all models
Feeds per revolution of spindle	(.004" .007" (.010" .020"		on all models
Bearing of arm on column	14"	16"	16"
Size of main driving motor	2 HP.	2 HP.	2 HP.
Height of drill column over gears	89"	98"	98"
Working Surface of Base	29"x45"	36"x60"	36"x82"
Net weight	4000 lbs.	6200 lbs.	7000 lbs.

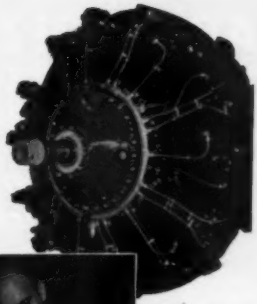


EARLY DELIVERY POSSIBLE

CANEDY-OTTO MANUFACTURING CO.

CHICAGO HEIGHTS, ILLINOIS

WHEN *Life hangs on a thread*



Above: Wright Dual Cyclone Aircraft Engine

Left: Checking crankshaft threads for a Dual Cyclone

FE OF AIRCRAFT ENGINES— service life, and only too fre- ntly also the life of pilots who behind them — depends greatly the accuracy with which such gines are made. Nowhere is pro- ction "inspection" carried farther n in the industry which builds gines for our fighters, our bomb- and our transports—engines that required to develop as much a horsepower for every pound.

Here you will find X-rays to look ide vital parts to determine ether the metal is sound through- . . . magnetic instruments which close surface flaws so minute the eye cannot detect them . other devices so sensitive they eal surface irregularities of a llionth of an inch.

And widely used in this industry, o, you will find "Detroit" thread ges to check on the accuracies "threads on which life may hang": reads for connecting rod bolts nuts, threads for cylinders and linder heads, threads for crank- afts, internal threads and external reads of all kinds.

"Detroit" thread gages, plug and ring, are not built to a price. They are produced, first and last, to meet the most exacting of inspection requirements. That they are so low in cost is due solely to manufacturing ingenuity, including the use of production equipment specially designed and developed by ***Detroit Tap*** to produce, in quantities, thread gages of "master" accuracy and high resistance to wear.

We will be glad to send you a catalog showing not only the line of "Detroit" thread gages, but also ***Detroit Tap's*** other products: standard and special taps and thread production tools.

ETROIT TAP & TOOL Company 8432 BUTLER DETROIT

NO WAITING!

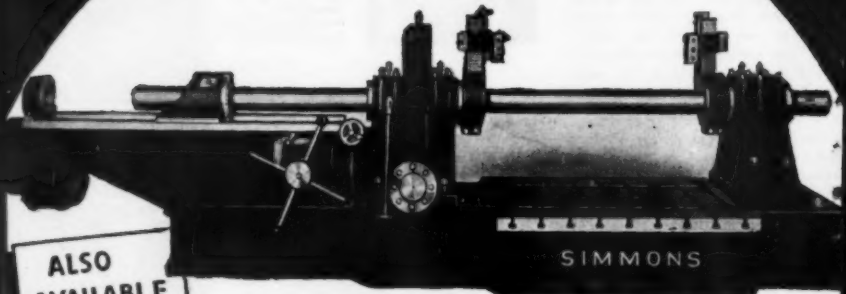
6" BAR HORIZONTAL

BORING AND FACING MACHINE

Immediate Shipment with 17' Boring Bar
30 Day Delivery of Machine with 24' Bar

SPECIFICATIONS

Diameter, Boring Bar	6"
Travel of bar in one setting	60"
Capacity of facing heads	9" to 38½"
Widened portion of bed	51½"x68", 18" High



ALSO AVAILABLE WITHOUT CENTER SECTION OF BED

This new Simmons 6" Bar Horizontal Cylinder Boring and Facing Machine is ideal for current War Production requirements. The bed which is of massive construction, is heavily ribbed to insure maintained alignment.

Equipped with Simmons Micro-Feed Unit, an infinitely variable transmission, this boring machine offers both fine and coarse feeds ranging from .004" to 1.000" per revolution of spindle. The main drive to the boring bar is obtained through a six-speed gear box, motor-driven. Gears are of high-carbon steel and mounted on splined shafts with anti-friction bearings running in oil. Power Rapid Traverse to bar in both directions.

Write TODAY for Descriptive Bulletin.

SIMMONS MACHINE TOOL CORPORATION

***Main Office:* 1725 NORTH BROADWAY, ALBANY, N. Y.**

***New York Office:* 149 BROADWAY**

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MICRO-SPEED

LATHES · TURRET LATHES · MILLERS · PLANERS · 6" BAR BORING MACHINES

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CONVERTED TO WAR WORK

Do Your Motors Match The Job?

Now's work for machines means new jobs for motors. Make this MOTOR FITNESS TEST a basic point in your conversion program. It will help you to get the most out of each machine, to achieve peak output sooner, and to forestall future shutdowns.

MAKE THIS
MOTOR FITNESS TEST

1 WHEN YOU SHIFT a machine to war work, even if there is no real change in the type of work the machine will be doing—

● CHECK MOTOR CONDITION. Examine bearings, insulation, etc.

2 If you relocate the machine, or change other machines nearby—

● CHECK POWER SUPPLY.

● CHECK ON PHYSICAL protection of the motor.

● RECHECK ALIGNMENT and mounting arrangement.

3 WHEN YOU BEGIN the first trial run on new work—

● MEASURE VOLTAGE AND DETERMINE AMPERE VALUE under load with a hook-on voltammeter.

● CHECK MOTOR STARTING CHARACTERISTICS.

4 AS YOU PLAN new operating schedules—

● REVIEW THE MOTOR LUBRICATION AND MAINTENANCE ROUTINE.

The G-E Motor Fitness Manual Tells How to Do It

5 SHOULD YOU FIND motors now in service inadequate for the job—

● GET IN TOUCH WITH YOUR LOCAL G-E MOTOR REPRESENTATIVE, who will advise you as to whether it should be repaired, rebuilt, or replaced.

And remember—IF NEW MOTORS ARE REQUIRED to meet present-day conditions, G-E motors in open construction (1 to 100 hp) are generally available without delay for high-priority war jobs.

Motor Fitness Manual →

for plants converting or already converted, to war production. Tells what to do to get the most out of motors, old or new. If you're undertaking new work on motor-equipped machines, if you're "switching" motors from one job to another, or equipping machines with new motors—you'll find here helpful motor facts to save your time. Send for a copy.

General Electric, Sec. D 750-143
Schenectady, N. Y.

Yes, send me a copy of your new Motor Fitness Manual, GEA-3873.

Name .....

Title .....

Company .....

Address ..... State .....

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BUILDER OF *TRI-CLAD* MOTORS

GENERAL ELECTRIC

NO WAITING!

6" BAR HORIZONTAL

BORING AND FACING MACHINE

Immediate Shipment with 17' Boring Bar
30 Day Delivery of Machine with 24' Bar

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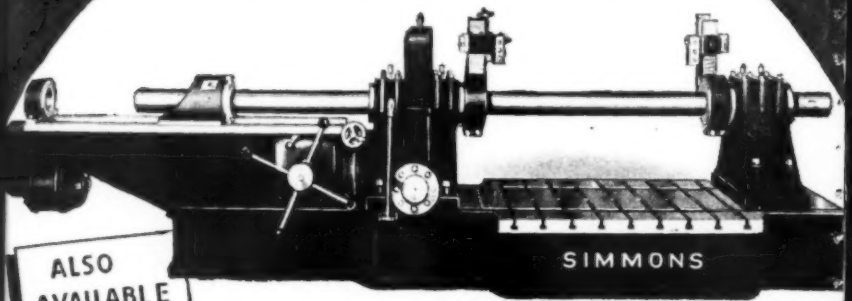

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Main Office: **1725 NORTH BROADWAY, ALBANY, N. Y.**

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SIMMONS

MICRO-SPEED

LATHES · TURRET LATHES · MILLERS · PLANERS · 6" BAR BORING MACHINES

IN PLANTS CONVERTED TO WAR WORK

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BUILDER OF TRI-CLAD MOTORS
Reg. U.S. Pat. Off.

GENERAL ELECTRIC

Automatic Chucks

Automatic (magazine) Feeds—if desired

*Combined Operations

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Burr O.D.
Face End

Chamfer I.D.
Face End
Thread O.D.

Chamfer O.D.
Face End
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- ✓ Used in Defense Productio for Primer Tubes, Bombs, To Tread, Tubes and Pins, etc.
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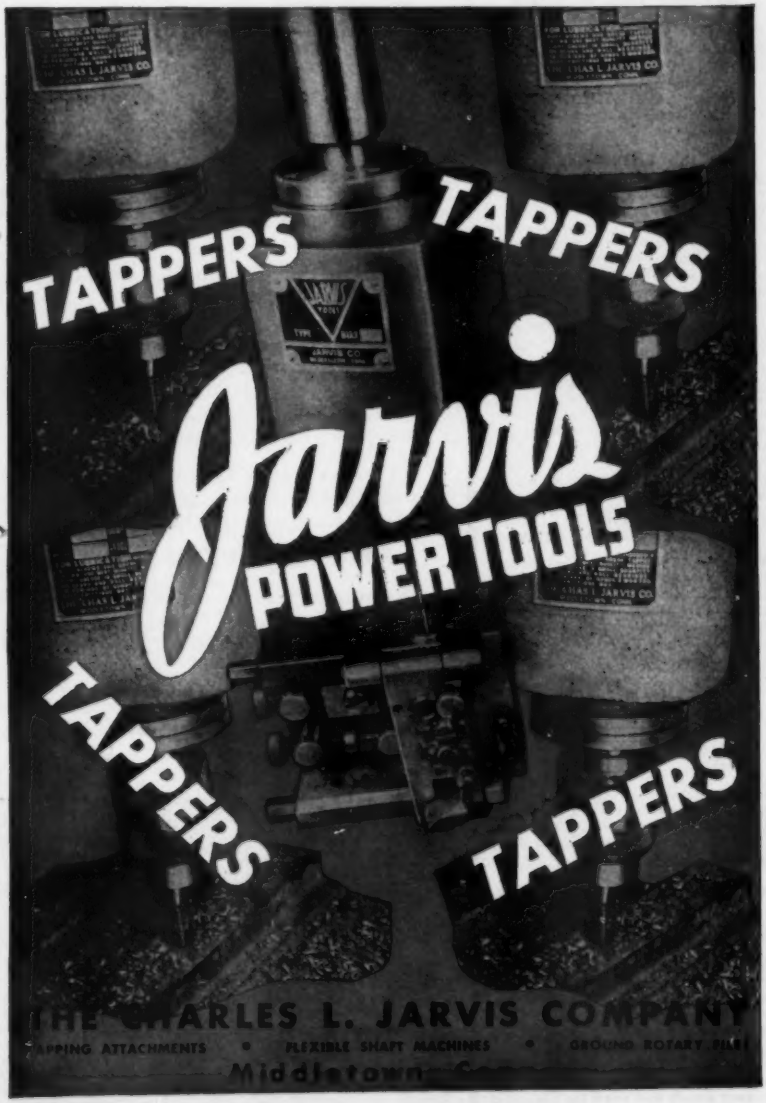
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THE CHARLES L. JARVIS COMPANY
APPING ATTACHMENTS • FLEXIBLE SHAFT MACHINES • GROUND ROTARY FILES
Middletown

BEHIND THE SCENES with DoAll

Metal and alloy parts cut on the DoAll Contour Machine are so smooth and clean that they are all ready for use *without further machining* or finishing. Think of the time this saves!

Then, to add to its versatility, DoAll production engineers have developed valuable *plus* equipment to handle all kinds of heavy work and jobs of irregular shapes — hydraulic work feeds; rip fences; ball-bearing work slides; work holders and guides; supports for long, heavy parts; mitering attachments for cutting tubing and channel stock at any angle; circle cutting fixtures; illuminating magnifying glasses; and others.

AIRPLANE AMBULANCES

The U. S. Air Corps has a fleet of mobile machine shops for repairing damaged planes right on the spot — the shop goes to the plane. Each "ambulance" contains a DoAll Machine as part of its essential equipment.

FOR THAT "BETWEEN MEALS" SLUMP

For the past two years, Continental has been distributing free vitamin tablets regularly to employees, and since early this spring, they have also provided free drinks during the middle of each morning and afternoon. Here's a typical month's consumption:

Milk	36,755 bottles
Tomato Juice	4,575 bottles
Orange Juice	888 bottles
Total	42,218 bottles

It is estimated that it takes a herd of 26 cows chewing their cud for 30 days to produce the milk. Who says Continental isn't looking out for the farmer?

KING PIN OF SPEED CONTROL

The Speedmaster was originally invented to provide infinitely variable speed (6 to 1 ratio) for DoAll Contour Machines. It wasn't long, however, before manufacturers of machinery in other fields discovered that this compact little unit was adaptable to their machines also. Today Speedmasters are controlling machine speeds in plants making hats, textiles, paper boxes, wire and metal products, bakery goods and even for cleaning tons of walnuts. Send for the new 40-page Handbook telling all about the many and varied applications of the Speedmaster.

DoAll

● Uncle Sam tells us that every ounce of metal saved is vital right now. DoAll saves tons and tons by slicing off any metal or alloy as clean as a whistle. Makes no difference whether it's internal or external cutting, this ultra-modern production machine follows a hairline without any waste. Uncut portions of metal are usable.

Compare DoAll's economic performance with that of shapers, millers and other machines which reduce tons of metal to chips.

A SIZE FOR EVERY JOB

There is a DoAll to do your particular job faster and better. Throat capacities from 16" to 60". Priced from $1000 to $5000, including motors.

Let a factory trained man come to your plant with a DoAll and prove its metal and time saving ability to you.

FASTEST METHOD TO REMOVE METAL

n production plants everywhere, DoAll is wrecking for-er time schedules—doing important sawing and filing obs in one-half, one-quarter or one-eighth former time.

EW BOOK—"DoAll on Production" shows DoAlls at ork in leading plants. An interesting story told in pic-ures. Send for copy.

CONTINENTAL MACHINES, INC.
300 S. Washington Ave., Minneapolis, Minn.
Connected with the DoAll Company: The Pioneer Manufacturers of Band Saws and Band Files for Quick Cutting Metals

Let Wagner fill this spot... for highest Machine Tool efficiency!

Machine tool efficiency is of vital importance in the present speed-up of production. Motor failure with attendant delay and expensive "out-time" cannot be tolerated in this national emergency.

Your best protection against production delay and unnecessary expense is to use Wagner Motors on all machine tools and other electrically driven equipment. Their long life and absolute dependability make them well-suited for the job.

Wagner motors, the first choice during peacetime, can be depended upon to do "double-time" during this crisis. They are available in a variety of electrical types and sizes to take care of all kinds of machine tools. A few of the many Wagner motors are illustrated below. For information on the complete line write for bulletins MU-182 and MU-183, or consult the nearest Wagner branch office. Wagner branches are conveniently located in 25 principal cities. Wagner field-engineers will be glad to help you.

Type RP Squirrel-Cage motors are used on machine tools and other electrically driven equipment that operate in clean, dry locations. 1/6 to 400-hp, 25 to 60 cycles, 2- or 3-phase.

Type HP motors are ideal for machines located where inflammable materials and substances are handled or manufactured. 3/4 to 125-hp, 2- or 3-phase, 25 to 60 cycles.

Type CP totally-enclosed fan-cooled motors are widely used on machine tools where dust, dirt, filings, chips, fumes or other destructive elements are prevalent. 1-1/2 to 125-hp, 25 to 60 cycles, 2- or 3-phase.

Send for copies of BULLETINS MU-182 and MU-183

Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, Mo. U.S.A.

SALES & SERVICE BRANCHES IN TWENTY-FIVE PRINCIPAL CITIES

MOTORS · TRANSFORMERS · FANS · BRAKES

99 99/100% PERFORMANCE

OPERATION

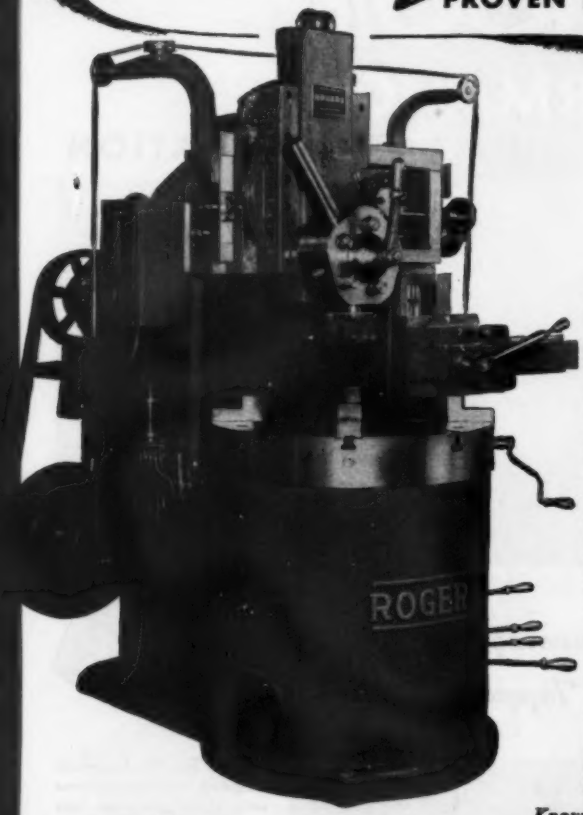
What's your average on Airplane Valve Tappet Guides?

A Four-Spindle Conomatic produced 38 of these airplane valve tappet guides per hour over a period of 11,000 hours. During this period the machine was down only 12.7 hours for minor adjustments.

ROGERS *"Perfect 36"*
VERTICAL TURRET MILLS
give you all three

✔ ATTRACTIVELY PRICED ✔ QUICK DELIVERY

✔ PROVEN DESIGN



Yes, Rogers gives you all three ***PLUS features that cut production time.***

Rogers specially designed swivel side head can be set at any angle up to 35 degrees each side of vertical to provide easier, quicker, tool setting for irregular shaped pieces.

Level chuck on Rogers Vertical Turret Mills allows the work to slide into exact position, without "jockeying" around, in a ***minimum amount of operator's time and subsequent reduction of "down time."***

Call on Rogers today and tomorrow to "Machine It on the Level."

Rogers Are Now Making Surprisingly Quick Deliveries At Real Attractive Prices.

Knowing How Since 1885

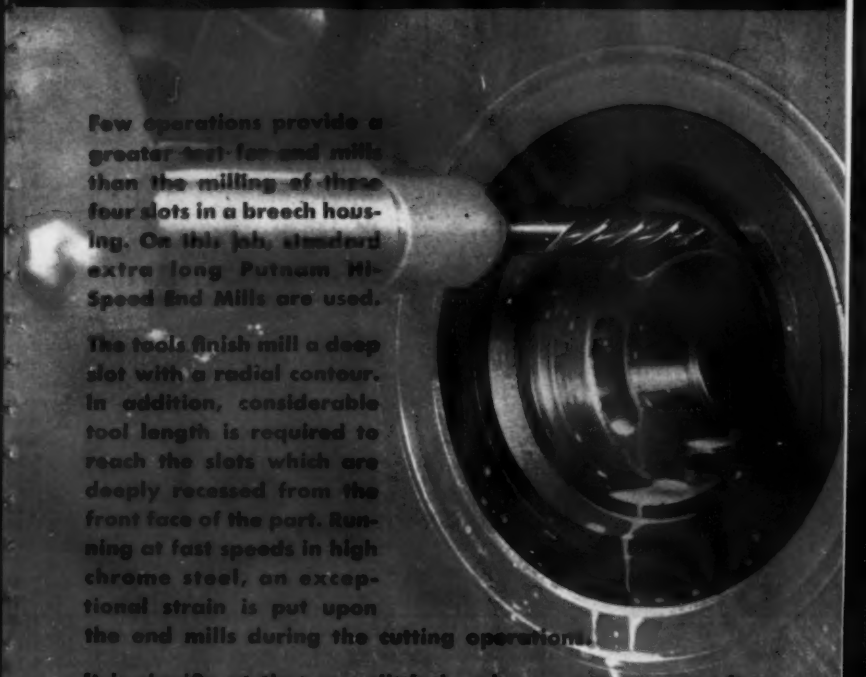
FEATURES

Swivel side head sets at any angle up to 35 degrees each side of vertical . . . 36" diameter capacity . . . 8-sided main turret and 4-sided side turret . . . rapid traverse on main head . . . box type main and side head rail with saddle, swivel and tool stake . . . 6¾" diameter spindle with 175 sq. in. V-shaped bearing 14⅞" in diameter . . . foot operated controls . . . standard and high speed models.

ROGERS
MACHINE WORKS INC.
FACTORY: ALFRED, N. Y.
SALES OFFICES: 125 ARTHUR ST., BUFFALO, N. Y.

UNUSUAL DEPTH...SPECIAL CONTOURS

...A Job For Putnam End Mills



Few operations provide a greater test for end mills than the milling of these four slots in a breech housing. On this job, standard extra long Putnam Hi-Speed End Mills are used.

The tools finish mill a deep slot with a radial contour. In addition, considerable tool length is required to reach the slots which are deeply recessed from the front face of the part. Running at fast speeds in high chrome steel, an exceptional strain is put upon the end mills during the cutting operations.

It is significant that very little breakage—and as a result, a minimum of production slow-down—has occurred with Putnam End Mills in constant use.

PUTNAM *Hi-Speed* END MILLS

PUTNAM TOOL CO. • 2983 Charlevoix Ave. • Detroit

Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . .
that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock.

Send us your specifications and blueprints—We will see that your job is set up with the right LIVE CENTER—prompt deliveries on high priorities.

STURDIMATIC

TOOL COMPANY

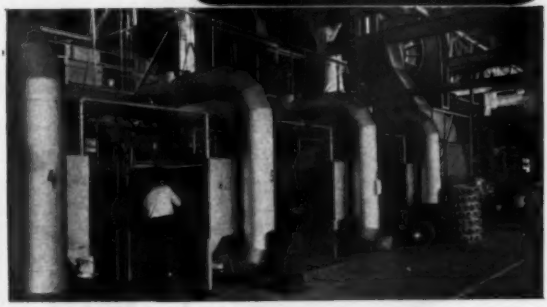
5224 THIRD AVE. DETROIT, MICH.

Dust created by portable grinders is handled by Roto-Clones connected by underflow ducts to floor grills. Note AAF filters above Roto-Clones for returning cleaned air to workroom when desired.

EFFECTIVE DUST CONTROL

Keeps production lines moving *Faster!*

(Right) Type W Roto-Clone exhausting cleaning benches where magnesium castings are finished.



Where outside exhaust is impractical, Type D Roto-Clone self-contained units equipped with air filter after-cleaners solve dust problems created by metal grinding.

The problem of providing clean air for both the protection of workers and materials in process has assumed primary importance in many war materials industries where production lines must not be slowed down by destructive dusts. If you have a dust problem, write for "AAF in Industry" a new booklet which describes the complete line of American Air Filter equipment. Better still, write for name of the nearest AAF engineer to you—he will be glad to discuss your dust problems without obligation.

AMERICAN AIR FILTER COMPANY, INC., 312 CENTRAL AVE, LOUISVILLE, KY.

IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

Here's How to Get More Efficient Tapping at Lower Cost

The exclusive advanced design of the new Procunier Tapping Heads assures you accurate tapping at high speeds with automatic protection for taps! Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel", or pressure on the clutch, required to drive them thus avoiding needless tap breakage. With this sensitive Procunier smooth-operating friction clutch, bottom tapping is as simple as through tapping, since the clutch instantly slips should the tap strike bottom or stick due to tap loading. Built to stand up under hard service. Many other features. If you want to reduce your tapping costs

Cross section of Tru-Grip Tap Holder showing positive drive to tap.

Send For Bulletin

giving full details, description and prices on complete line of Procunier Precision Tapping Heads to meet all needs. The new Tru-Grip Tap Holder—and also the full line of Procunier Universal Tapping machines, hand or foot-operated.

Procunier Safety Chuck Co.
14 S. Clinton St., Chicago

Send me bulletins on: // High Speed Tapping Heads // Tru-Grip Tap Holders // Universal Tapping Machines.

Name .....

Address .....

PROCUNIER **SAFETY CHUCK CO.**
14 S. Clinton St., Chicago, Ill.

PRODUCE STILL MORE
get 20% greater tool efficiency with

MO-MAX

TRADE MARK REG. U.S. PAT. OFF.

MOLYBD... TUNGSTEN ... HIGH SPEED ... STEEL

Milling cartridge clearance slot in machine gun. On jobs such as this, MO-MAX is the logical choice.

MO-MAX makes possible maximum conservation of vital alloys.

1 It contains *less than two percent of tungsten.* This amount is being produced in this country or is available from existing high speed steel scrap.

2 It contains only *one percent* of vanadium—a critical alloy.

3 Molybdenum is produced in large quantities within our borders.

4 A chromium content of 3.50 to 4.00% is satisfactory—thus a minimum of chromium is required.

5 MO-MAX has a nine-year record of proved performance, and can be obtained from fourteen leading steel manufacturers.

For Technical Data Booklet!

Write any of the steel makers listed or to The Cleveland Twist Drill Co., Cleveland, Ohio.

LNW . . . Allegheny Ludlum Steel Company

MOHICAN . . . Atlas Steels, Ltd.

BETHLEHEM HM . . . Bethlehem Steel Company

MO-CUT . . . Braeburn Alloy Steel Corporation

STAR MAX . . . Carpenter Steel Company

MOLITE 8 . . . Columbia Tool Steel Company

REX TMO . . . Crucible Steel Company of America

DI-MOL . . . Henry Disston & Sons, Inc.

REX TMO . . . Halcomb Steel Division Crucible Steel Company of America

MOGUL . . . Jessop Steel Company

TATMO . . . Latrobe Electric Steel Company

S.T.M. . . . Simonds Saw and Steel Company

MO-TUNG . . . Universal-Cyclops Steel Corporation

VUL-MO . . . Vulcan Crucible Steel Company

2426

You can get the work benches you need ...easily, economically

From 1367 HALLOWELL work-bench combinations, war plants can get the work-benches they need. No detailed drawings to do; no ordering of multifarious sizes of lumber; no carpentry costs. HALLOWELL work-benches are quickly set up, in any arrangement, strong as a rock, absolutely rigid without costly bolting to floor.

* Fig. 928 Drawer is extra

* Fig. 1334

* Fig. 1267

* Pat'd. and Pat's. Pending

HALLOWELL

SHOP EQUIPMENT

If necessary, HALLOWELL work-benches can be easily moved, without injury to floor or walls. Tops are of smooth, high grade laminated wood, Masonite, or if advantageous, of steel. Welded angle legs in five different heights and widths for your selection.

HALLOWELL Stools: Styles to meet every possible requirement, permitting correct posture and comfort. Welded angle legs and braces. Integral slide-easy dome feet will not catch, scratch or tear. Write for catalog today.

STANDARD PRESSED STEEL CO.

JENKINTOWN, PENNA. BOX 606

BRANCHES

BOSTON • DETROIT • INDIANAPOLIS • CHICAGO • ST. LOUIS • SAN FRANCISCO

CUTTING-OFF

Now Made Much Easier for

All Lathe Operators!

LOMBARD POWER-FEED TOOL HOLDER
Eliminates Cut-off Problems

Cutting-off in a lathe has always been a most difficult job, because the stock jumps, lifts and climbs on the tool—breaks tool, or ruins work. All this is now made impossible with the Lombard Power-Feed, Steady-Rest Cut-Off Tool-Holder, because the blade is always held in the same steady position in relation to center of work—no chance for work to lift. Chips cannot build up, or stick to side of cut, because they are cleared out on each revolution of the work, due to the tool operating smoothly without vibration.

Makes Cut-off Blades Last Much Longer

—because they don't break, due to steady-rest support.

It's the New Way to Cut-off!

Different from Any Other Cut-off Tool Holder

—because it has a steady-rest that rides over the work when cutting off in a lathe. It holds the cut-off blade steady, preventing chatter. Instead of breaking chip, it peels off a continuous ribbon. Operates perfectly on Power-Cross-Feed.

Operates Smooth and Steady

Stock can't lift. Different—has a shearing action. Makes any lathe cut-off even smoother than most screw-machines. Makes tool cut like cheese.

GUARANTEED

to be the smoothest cut-off tool ever used, or money will be refunded.

PRICES

For 12' to 14' Lathe..... $14.75
For 16' to 18' Lathe..... $15.75

Add $2.00 for Extra Heavy Duty Model

Order Direct! Money-back Guarantee!

LOMBARD MANUFACTURING CO.
16217 Linwood Ave. Detroit, Mich.

Something to Crow About

NEW "L" SERIES

CHICAGO STEEL PRESS BRAKE

BOX AND PAN BRAKE—

POWER BENDING BRAKE—

The Box and Pan Brake forms boxes or pans from one piece of metal. A straight brake as well as a box brake.

The Power Bending Brake is indispensible wherever a volume of heavy plate work is to be done. Forms a great variety of bends and shapes, without dies.

Send your bending problems and write for complete information on all our Press Brakes.

The World's oldest and largest manufacturer of all-steel constructed machinery announce a new low priced modern all steel press brake for the heavy sheet metals and light plate work.

All the main members constructed of rolled steel plate. Equipped with one bull gear inside each end housing. Eccentrics made in one piece with bull gears. Adjusting screws encased in supporting sleeves operate in vertical non-oscillating position. All gearing, eccentrics, ram plungers and ram adjusting worms enclosed in oil.

Ram operates at variable speeds — slow when bending long sheets or fast when forming small pieces. Change of speed is accomplished by turning hand wheel.

DREIS & KRUMP MFG. CO.

7440 LOOMIS BLVD. CHICAGO, ILLINOIS

THE COLLET THAT CONTRIBUTES

To The War Effort

...SAVES CRITICAL STEEL

...SAVES PRODUCTION TIME

...REDUCES COLLET INVENTORIES

When you use Martin Master Collets, replacements due to wear are limited only to the pads. You don't discard entire collets, and you don't require complete new collets which require critical nickel steels in their manufacture.

They reduce collet "change-over time" to an absolute minimum. A complete change of collet size is accomplished in from five to seven minutes. And because the pads produce the required sizes, a considerable reduction can be effected in inventories usually maintained for solid collets. A supply of pads in various sizes, occupying very little storage space, will meet innumerable requirements.

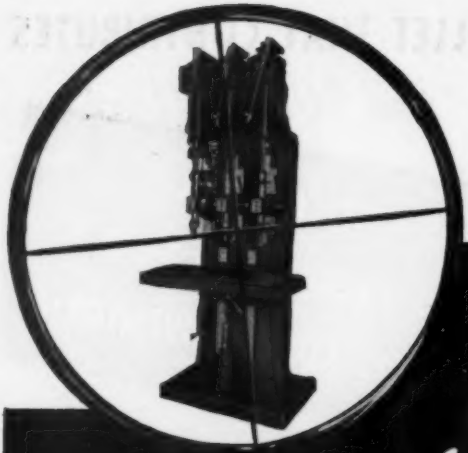
With the Martin Master Collet, interchangeable pads are removed from the end of the collet. The collet itself remains in operating position in the machine. The pads are integral parts of the locking wedges which fit tightly into the end of the collet. They will positively not become loose. When it is necessary to change the pads, a few turns of the wedge screws permit quick removal.

THE MARTIN MASTER COLLET

Manufactured By

MODERN COLLET and MACHINE CO.

403 Salliotte Street - - - Ecorse, Michigan



"Train your Sights" ON Avey DRILLING MACHINES

. . . these standard type Aveys are famous for their Versatility — maintaining high production levels. In the "sights" is our type MA-6. It is built in No. 2 and No. 3 sizes one to six spindle units, any size—six speed machine two speed motor with three mechanical changes through gearing-speed range, eight to one-push button control as shown. The machine illustrated has three spindles. The Aveymatic Feed, the Hand Feed and the Tapper.

THE AVEY DRILLING MACHINE CO.
CINCINNATI, OHIO, U. S. A.

Avey DRILLING MACHINES
CINCINNATI . OHIO

FUNCTIONAL FLEXIBILITY

Designed particularly for the aircraft industry this 650-350 ton Hydro-Dynamic Double Action Press features:

Speed change—by position—by pressure.

Reversal—by position—by pressure.

Stroke of each slide adjustable.

Relative stroke adjustable.

Operation as Single Action press of 1000 tons capacity.

Operation as a "So-Called" triple action using the cushion.

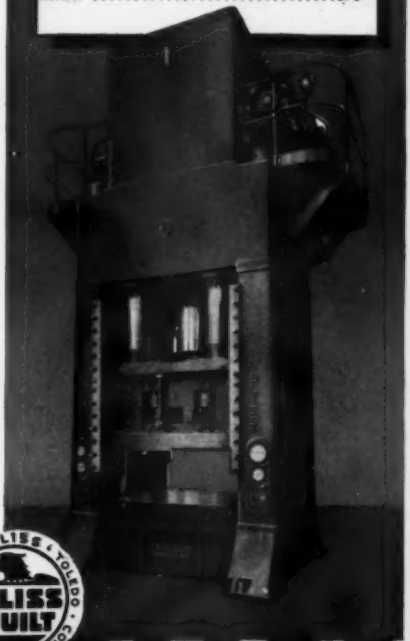
Operation of cushion as ejector.

Independent pressure control on each cushion pad.

Similar presses can obtain increased speeds up to 500%.

Additional information is available upon request.

CAPACITIES—TONS	
Capacity of frame	1000
Capacity of punch slide	650
Capacity of blankholder slide	350
Capacity of cushion	150
DIMENSIONS—INCHES	
Bed area F to B X R to L	60x74
Cushion pads—two each	34x32
Draw and liftout capacity	14
Maximum blank size	50x58
Maximum punch size	40x60
PRESS SPEEDS—INCHES PER MINUTE	
Quick advance to work	450
Pressing	30½
Return	375



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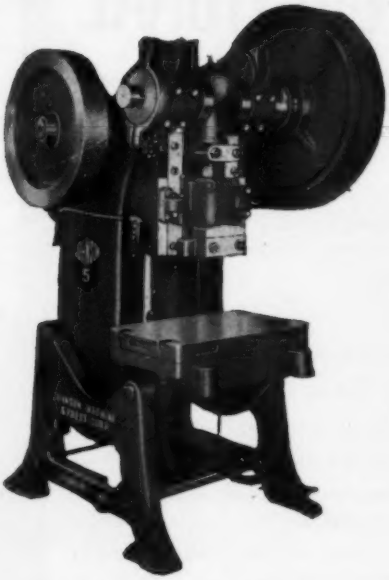
BIG

PRODUCTION INCREASES

With Modern

JOHNSON POWER PRESSES



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Much Larger Die Space *Than Average Presses.*

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Reinforced Construction at *Points of Greatest Wear.*

If you want the best, send for Illustrated catalog describing complete line TODAY.

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42 years engineering experience built into every Johnson Press used by leading manufacturers throughout the world!

NDISPENSABLE *for* WAR RODUCTION

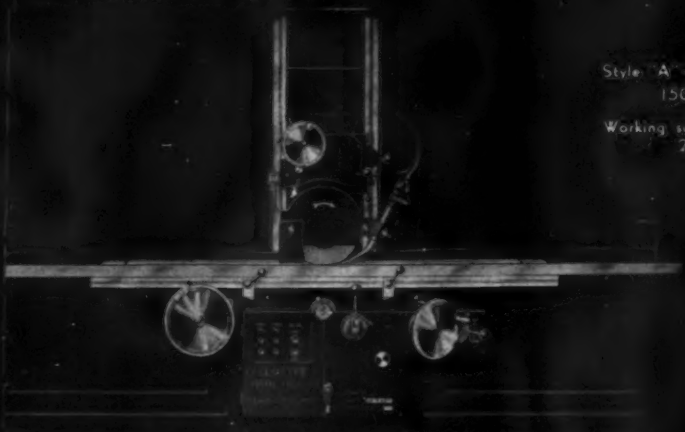
No. 55—Table speeds up to 125 ft. per min.

Working Surface—12"x36".

iese Grand Rapids Grinders, and others, will enable you meet the demands of the present Defense program.

ey offer you new standards of grinding performance— w production economies and new facilities for improv- your products.

us send you complete details on these and other RAND RAPIDS GRINDERS



Style "A"—Table speeds up to 150 ft. per min.

Working surface—12"x36" to 24"x72".

GALLMEYER & LIVINGSTON CO.

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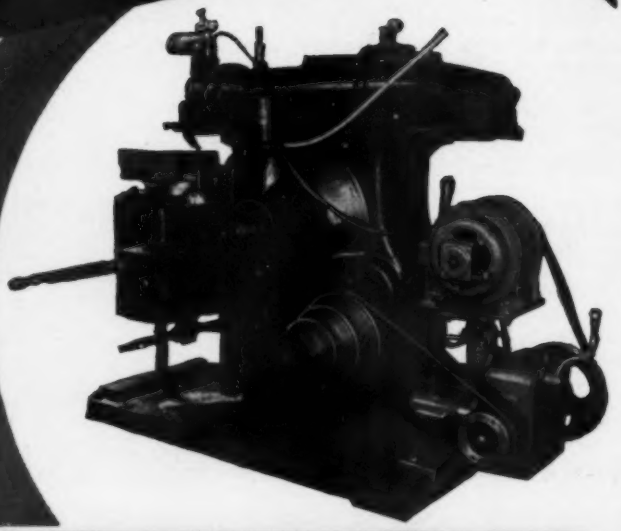
QUICK ACTION DRIVES

Are equipped to give you a maximum output from tools that are available. Efficient motorization gives you just the right speeds for the latest carbide tooling, enabling older machines to surpass their best previous performance.

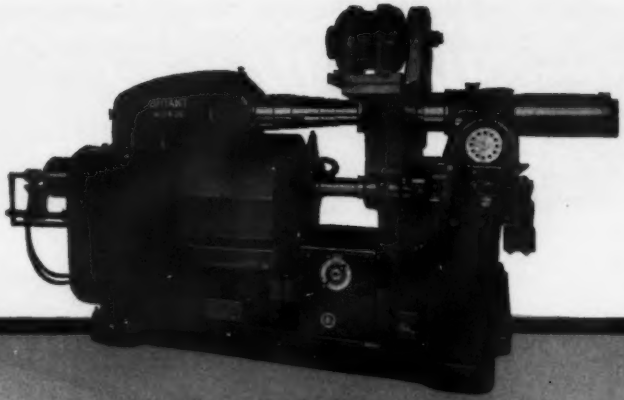
There is a Berkeley Drive for every machine tool. Each drive is specifically made to fit your most rigid requirements. *Write for Bulletin 50—No obligation.*



Berkeley

EQUIPMENT COMPANY

CORRY, PENNSYLVANIA



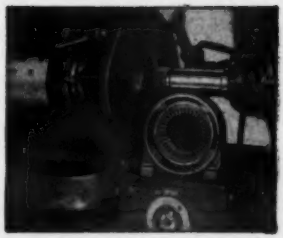
GRINDING MOTOR STATORS on the BRYANT No. 24-26

ELECTRIC motor manufacturers are relying on Bryant Internal Grinders for the precision and continuous production so vital to security today.

Precision is obtained by means of the Bryant principle of overhead wheel slide suspension—high production is maintained through single lever control features, automatic sizing, and simplified means of chucking.

Continuity of production is due to fundamental design and quality of materials and workmanship in Bryant Grinders. The Bryant No. 24-26, shown here, is equipped with a side loading type chuck. The motor stator is side clamped by means of an air cylinder.

Bryant is ready to serve you with greatly enlarged plant capacity and the knowledge gained by solving thousands of internal grinding jobs.



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SPRINGFIELD, VERMONT, U. S. A.

NO CHATTER • NO BREAKING OF CUTTERS • NO DAMAGED WORK

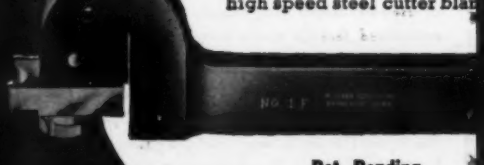
With Willard

SPRING TOOL HOLDER

Economical and most e
cient tool holders. A
number of cutters can be us
with the same holder. The
holders are adapted to a wi
range of work in the lat
shaper and screw machine.

Holder furnished with o
high speed steel cutter bla

Forming Tool Holders assure faster, smoother machining, free from cutter marks. One grind only sharpens cutter. Ratchet design prevents cutter from turning under heavy feeds. Key in bottom of holder prevents sidesway. Furnished with hardened wrench and one high speed cutter blank, unless otherwise specified.



Pat. Pending

Write for folder

Thompson

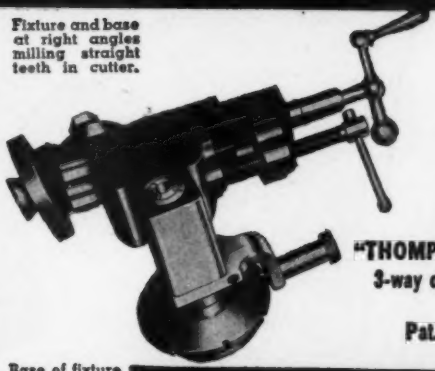
AUTO-ORDNANCE CORP.

1437 RAILROAD AVE., BRIDGEPORT, CONN.

"ANNOUNCING OUR NEW UNIVERSAL MILLING FIXTURE"

The Thompson
UNIVERSAL MILLING FIXTURE

Fixture and base at right angles milling straight teeth in cutter.



"THOMPSON" with the 3-way circular swing

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Base of fixture on 30° angle milling end teeth in cutter.

Fixture tilted at 30° milling end teeth in taper reamer.

The Thompson Universal Milling Machine fixture has been designed specially for use on any standard bench lathe. Converts, easily, quickly, into an economical, time saving milling machine. Provides a wide variety of applications—Vise and Universal slide base can be used without index fixture for straight or angular milling — efficiently used for milling punches, end mills, key ways, etc.

Write for more information

AUTO-ORDNANCE CORP.

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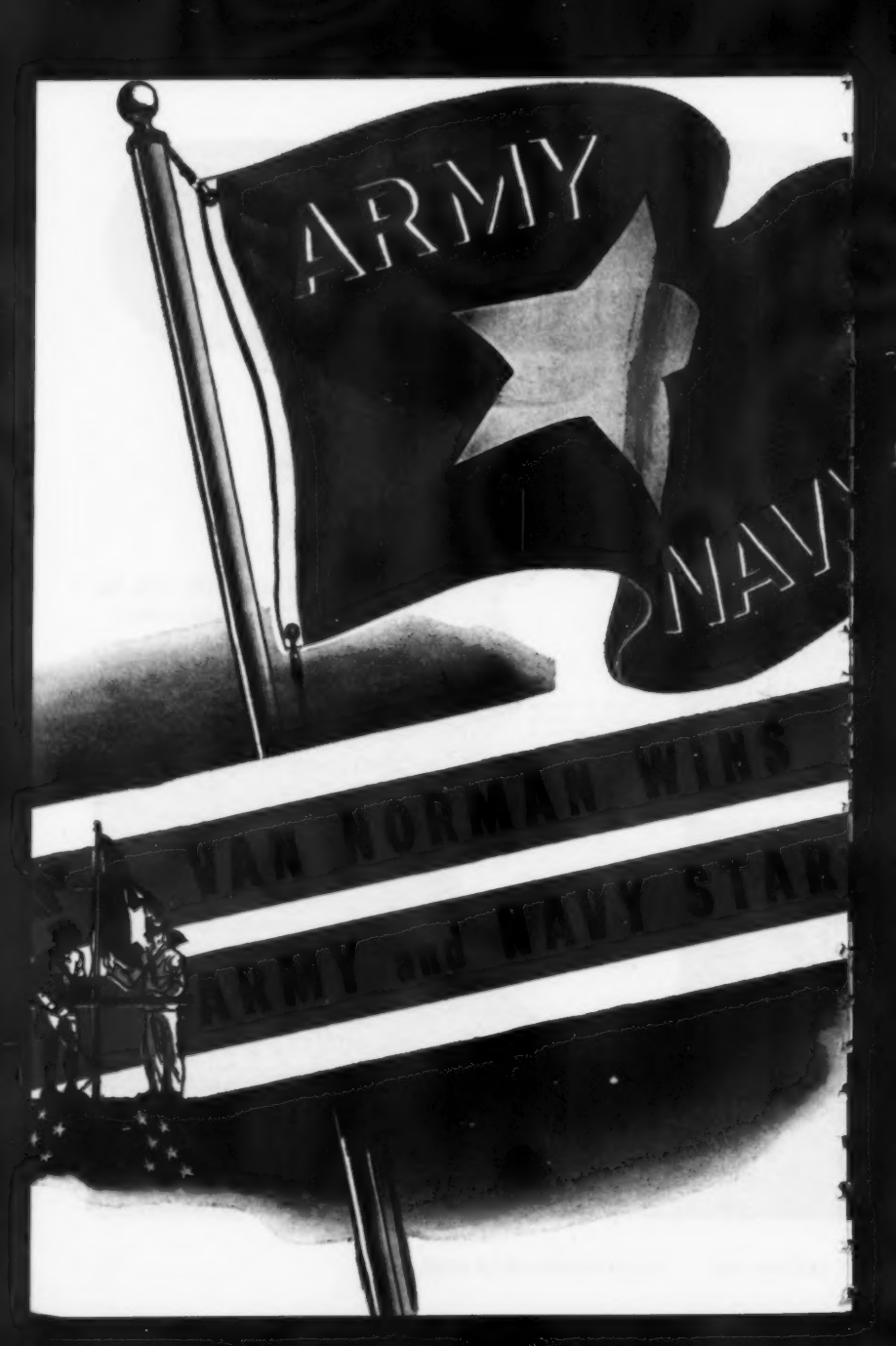

ARMY
NAVY
VAN NORMAN WINS
ARMY and NAVY STAR

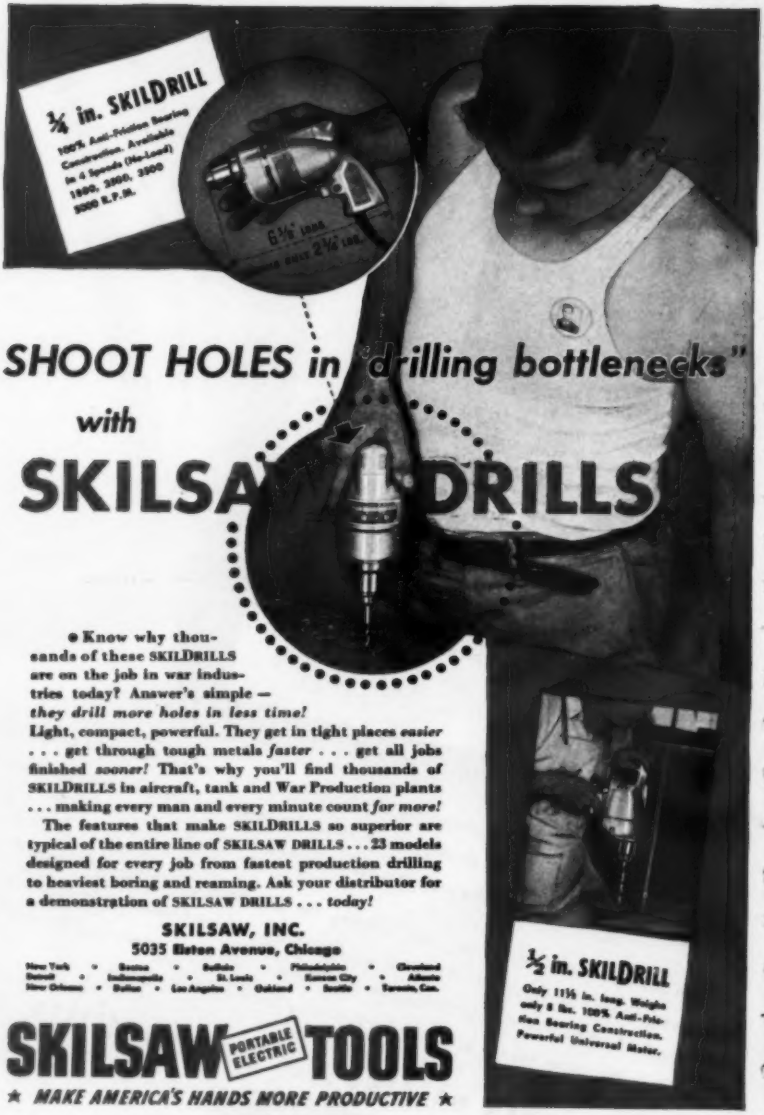
IN ACKNOWLEDGING THE AWARD TO HIS COMPANY OF THE ARMY AND NAVY STAR, VAN NORMAN PRESIDENT JAMES Y. SCOTT SAID IN PART:

"... this flag is more than just a flag. It symbolizes the tie that today exists between the fighting men of our Army and Navy and the fighting men and women of our labor battalion. It is a symbol of a new, greater spirit ... of unity, of devotion, of loyalty and determination in the cause of victory which we must and shall have, and a unity of thought between all sections of our people in serving their country."

This burgee was recently raised over the Van Norman plant in recognition of the company's record in producing milling machines and oscillating radius grinders for war-production plants, and automotive service machines for the armed forces.

To the last man and woman now wearing the Star button, Van Norman regards this insignia as a challenge for the future ... to top the highest former levels of production. And this challenge will be met ... for Van Norman will keep on earning the Army and Navy Star every hour of every day, until Victory is final and complete.

VAN NORMAN MACHINE TOOL CO., SPRINGFIELD, MASS


¼ in. SKILDRILL
100% Anti-Friction Bearing Construction. Available in 4 Speeds (No-Load) 1800, 2800, 3500 3500 R.P.M.
6⅛" LONG
2½" LONG

SHOOT HOLES in "drilling bottlenecks"

with

SKILSAW DRILLS

● Know why thousands of these SKILDRILLS are on the job in war industries today? Answer's simple — *they drill more holes in less time!* Light, compact, powerful. They get in tight places *easier* . . . get through tough metals *faster* . . . get all jobs finished *sooner!* That's why you'll find thousands of SKILDRILLS in aircraft, tank and War Production plants . . . making every man and every minute count *for more!*

The features that make SKILDRILLS so superior are typical of the entire line of SKILSAW DRILLS . . . 23 models designed for every job from fastest production drilling to heaviest boring and reaming. Ask your distributor for a demonstration of SKILSAW DRILLS . . . *today!*

SKILSAW, INC.
5035 Elston Avenue, Chicago

New York • Boston • Buffalo • Philadelphia • Cleveland
Detroit • Indianapolis • St. Louis • Kansas City • Atlanta
New Orleans • Dallas • Los Angeles • Oakland • Seattle • Toronto, Can.

½ in. SKILDRILL
Only 11⅝ in. long. Weighs only 8 lbs. 100% Anti-Friction Bearing Construction. Powerful Universal Motor.

SKILSAW PORTABLE ELECTRIC TOOLS

★ *MAKE AMERICA'S HANDS MORE PRODUCTIVE* ★

Featured In This Issue

Believing that the National War Effort will be facilitated by interchange of ideas, Westinghouse offers an assortment of interesting hints and suggestions on a wide range of subjects—in the story beginning on page 45

Many erroneous notions persist about Dial Indicators. I. A. Hunt of Federal Products Co., believes Dial Indicators deserve a better "break"—and tells all in his story commencing on page 75

Building leadership is the theme of Mr. Motterhead's sixth contribution in the series of articles on The Human Factors in Morale Building. Leadership is a serious problem, with the rapid expansion of personnel—and this discussion gives some helpful hints to that end, on page 89

"Billets to Bullets in 4-Acts" describes the use of batteries of power saws in the cutting of billets and subsequent trimming of shells. See page 113

"Shaped Diamond Tools" is another contribution in the series by Paul Grodzinski, British Consulting Engineer and specialist in the use of diamonds. He gives many suggestions that should be helpful in the successful use of these hardest of modern cutting tools, on page 123

"Aspects of Modern Milling" is the introductory offering in a series of articles on the subject by John E. Hyler. The author is a practical shop man, with many years of experience. A lot of the points he covers should be helpful. See page 141

As long as brass was plentiful, there was no legitimate reason why it should not be used unrestrictedly in brazing cast iron. In war times when every pound of brass is needed in our war efforts, there is no plausible excuse for using it on any cast iron repair job that might be welded with the parent metal. Altho Mr. Havens' suggestions bear directly on railroad maintenance work, still many of them are applicable to general industry. See page 161

"Investing 10% in America" is a plea for everybody to get behind the war effort with a weekly allotment from pay envelopes for U. S. War Savings Bonds. See page 173

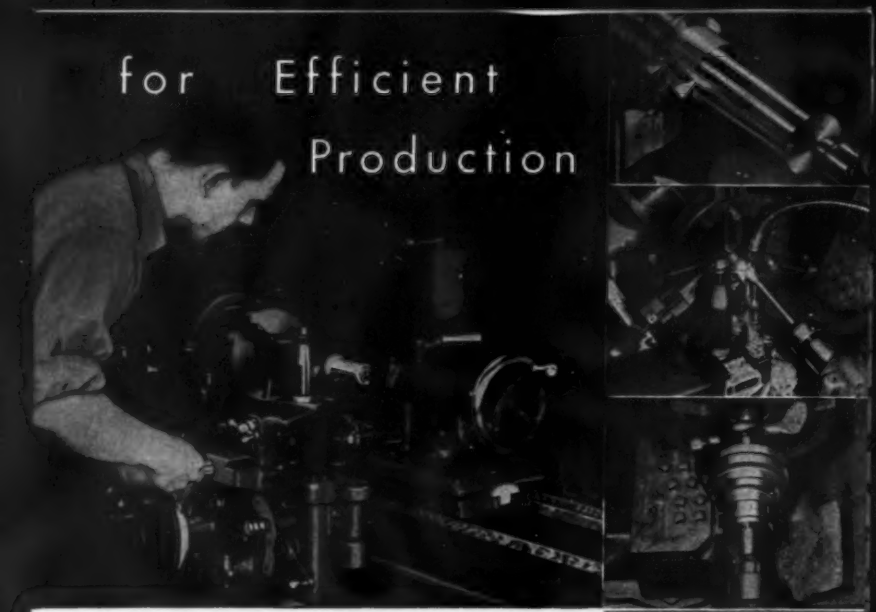
"Let's Talk Shop" is the regular section devoted to hints and suggestions. Among other features, two pages of useful tables are included which are worth a place in anybody's data book. See page 183

"Tooling-Up for Victory" presents the monthly parade of new machines and new equipment available for the war effort. See page 205

"Plants for Subcontract Work" presents additional facilities available for the war effort. See page 287

"Mechanics Through the Ages" is The BLUE BOOK'S exclusive picture page 192

For VICTORY, the War Production Board Asks you to "Throw Your Scrap into the Fight"



SOUTH BEND LATHES

EQUALLY EFFICIENT on precision toolroom work or close tolerance manufacturing operations, South Bend Lathes will help solve your production problems. Hundreds of nationally known manufacturers select them when streamlining their shop equipment to meet present day needs. Substantial savings in capital investment, power consumption, floor space and labor costs have resulted from their installation. They will give you the same efficient, trouble-free service they are giving in the shops of some of the largest war industries.

Many features contribute to the efficiency of South Bend Lathes. A wide range of spindle speeds permits machining work with maximum cutting tool efficiency. Their versatility reduces set-up time to a minimum. Smooth, vibration-free operation permits finish turning or boring with such precision that subsequent machine operations can often be eliminated. A convenient arrangement of controls makes for an ease of operation which reduces fatigue and lowers the probability of error.

Made in a wide range of sizes and types, there is a South Bend Lathe that will efficiently handle almost any class of lathe work. Write for catalog and name of dealer nearest you.

"HOW TO RUN A LATHE"

A practical reference book on the operation and care of metal working lathes. Widely used for training apprentices, new operators and students. Contains 128 pages, 5½" x 8", over 365 illustrations. Price 25 cents, postpaid.

SOUTH BEND LATHE WORKS

LATHE BUILDERS FOR 45 YEARS

Dept. 191 SOUTH BEND, INDIANA, U. S. A.

As The Editor Sees It

BEHIND the fighting lines, more than one bottleneck has had to be smashed in our mounting war effort.

The first of these—machine tools—was eliminated thru the loyalty, energy and resourcefulness of our machine tool builders.

Yankee production genius plus effective subcontracting and a lot of clever improvising is expanding war production and beating delivery dates all down the line.

Now another serious obstacle looms—and that is raw material to sustain our terrific production pace. We need steel, steel and more steel—which means mountains of scrap. It means digging into basements, attics and dark corners, unearthing every pound of iron or steel scrap that can be spared —junking non-essential and obsolete machines.

Believing that many plants still harbor scrap, in spite of previous "housecleaning," the War Production Board recently made some exploratory surveys in important centers. In the Chicago District, 25 plants are reported to have unearthed an average of 38-tons of scrap each.

To visualize the importance of this drive, 50 pounds of scrap means another 50-caliber machine gun on the fighting front.

Somewhere and somehow, it means that we must deliver to the steel mills something like 17 million tons of scrap by December 31st. A lot of it is needed right NOW!

Already, many "impossible" things have been done—and our national scrap requirements will be met if each and every one of us searches conscientiously in every nook, cranny and corner — and starts every available ton of scrap on its way to the steel mills without delay.

Wesley G. Paulson

Switch to NE Alloy Steels to Save Critical Metals

TO HELP conserve nickel, chromium, vanadium and other scarce metals, the War Production Board's ablest metallurgists have developed NE (National Emergency) Alloy Steels. These new steels contain relatively small quantities of alloying elements in such combination as to produce physical properties usually attributed to steels of much higher alloy content. The War Production Board stipulates the use of the new NE Alloys to *replace* the Standard SAE and AISI Alloy Steels for a wide range of applications.

Ryerson NE Alloy Steel stocks in six specifications, all fine grain, will be available shortly; and will consist of sizes ranging from ½-inch to 7-inch rounds, in three groups:

Carburizing Grades	*Medium Hardening Grades*	*High Hardening Grades*
NE 4023 and NE 8620.	NE 4042 and NE 8744.	NE 4047 and NE 8749.
To Replace AISI and SAE	To Replace AISI and SAE	To Replace AISI and SAE
Nos. A2300, A2500, A3100	Nos. A2330-35, A3130-35	Nos. A 2300, A 3100, A 3200,
A4100, A4600, A5100, A6100.	A4130-35, A5130-35, A6130-35.	A 4100, A 4600, A 6100.

Only limited data on heat-treatment response or physical properties will be available when NE Alloys are first ready for shipment. The WPB is anxious to know how these new steels will function and requests all NE Alloy users to report results in working with these new steels. Ryerson will cooperate fully with users, supplying laboratory test data, and all other available information.

***If you now use Alloy steel,* let Ryerson help you in adapting NE Alloys to your requirements wherever possible. Write, wire or phone the nearest of the ten Ryerson plants.**

Joseph T. Ryerson & Son, *Inc.*, Chicago, Milwaukee, St. Louis, Cincinnati, Detroit, Cleveland, Buffalo, Boston, Philadelphia, Jersey City

RYERSON STEEL-SERVICE

New Methods for Increasing War Production

By GEORGE A. FAIRMAN

FOR the first time, 3-dimensional photoelastic analysis has been applied to the ordinary nut and bolt, and has even shown how to increase the effective strength of huge turbine bolts as much as 40 per cent.

One of the oldest and most common of all fastening devices, the nut and bolt defy both mathematical stress analysis and strain measurement, or the commonly used methods of 2-dimensional photoelasticity. In 3-dimensional studies of scale models of the largest nuts and bolts used to fasten casings of steam turbines together, Dr. M. Hetenyi of the Westinghouse Research Laboratories reveals that the use of a nut with either tapered lip or tapered thread makes the effective strength of the fastening from 20 to 40 per cent greater—because modern turbines work at nearly 1000° F—almost a cherry-red—and the big bolts holding the parts together encounter extremely severe service conditions.

Dr. Hetenyi made transparent bakelite bolt models 1" in diameter (the steel bolts used on some turbines are 6" in diameter, 5 feet long, and weigh about 500 pounds), applied nuts of different types and loaded them in the same way they would be loaded in

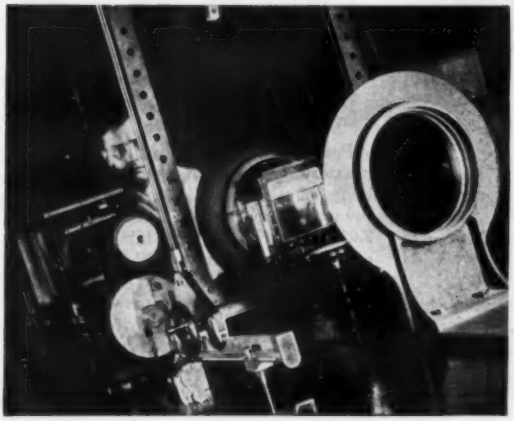


Fig. 1—Dr. M. Hetenyi, Westinghouse research engineer, used three-dimensional photoelastic analysis to determine best designs for steam-turbine bolts and revealed how to increase their effective strengths as much as 40 per cent.

Fig. 2—After the stress has been "frozen" inside the model, slices are studied.

service. The stressed models then were annealed 3 hours at 120° C and cooled to room temperature, after which a ⅛" thick length-wise slice was cut from the center of each.

Stress lines or fringes, "frozen" into these slices by the annealing process are made visible by the use of polarized light and show that the maximum stress, regardless of the kind of nut used, usually is at the root of the thread nearest to the bottom of the nut.

Fig. 4—The "frozen-stress" technique of photoelasticity has revealed how to increase the strength of huge 6" diameter turbine bolts like this as much as 40 per cent.

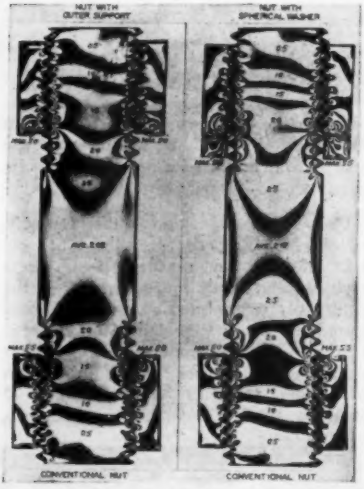
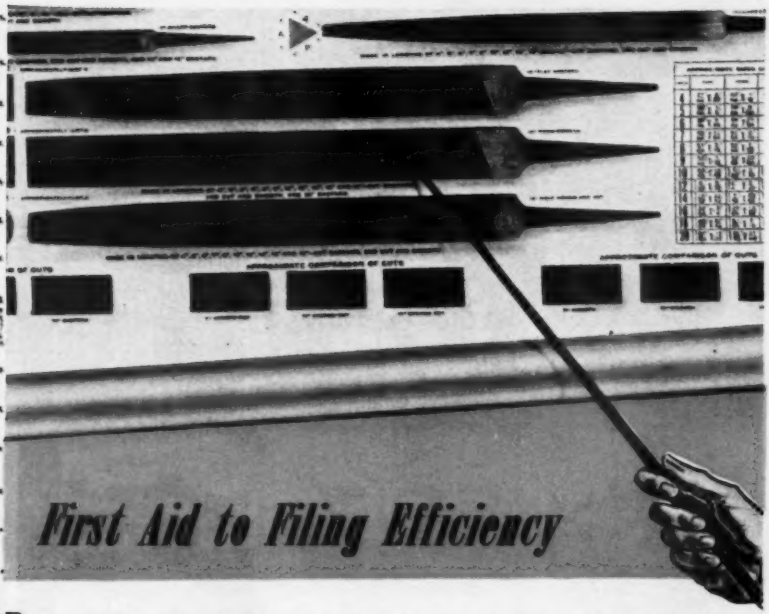


Fig. 3—This is how slices of the "frozen-stress" models of several combinations of nuts and bolts look in polarized light. Each of the dark bands represents a known amount of stress.

For a conventional nut, the ratio of maximum stress to average stress in body of the bolt, even for the most favorable shape of thread, is about 2.62. Tapered lips or tapered threads on the nut decrease this ratio to as little as 1.55. Dr. Hetenyi's study shows a slight advantage in favor of a nut with tapered lip, because it is effective at all loads. However, at present, practical application favors the use of tapered threads.



BESIDES making files of inherently high filing efficiency, Nicholson has developed numerous aids to enable machine-shop managements and workers to *bring out* that efficiency.

The Nicholson Wall Chart (portion reproduced above) is one. In addition to serving as a convenient tool-room guide to *The right file for the job,* this Chart constitutes a valuable basis for industrial "classroom" training.

These employee "school" sessions are usually presided over by a shop superintendent or foreman. (From their extensive studies of individual filing problems, Nicholson service engineers themselves have delivered educational talks before such groups.) Elementary literature on filing and technical bulletins on the features and uses of special purpose files are also available.

If you've a training auxiliary or program in which we can be of help with any of the aids indicated above, ***write us about it.*** For your file needs—and practical help on file purchases—contact your mill-supply house.

NICHOLSON FILE CO., PROVIDENCE, R. I., U. S. A.
(Also Canadian Plant, Port Hope, Ont.)

NICHOLSON FILES
FOR EVERY PURPOSE

NICHOLSON U.S.A.

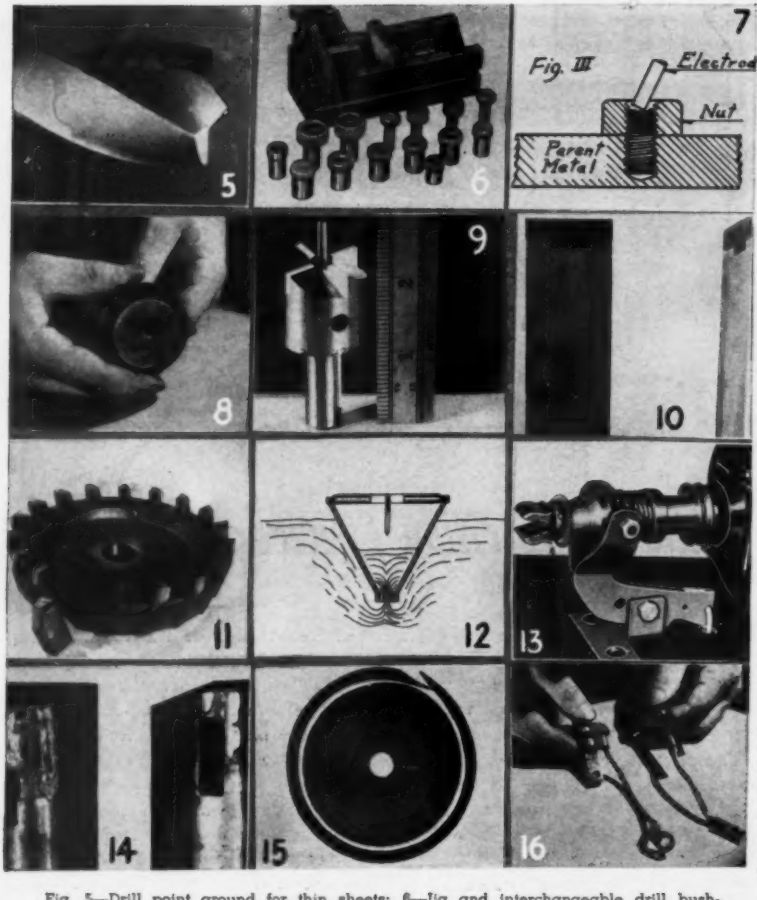


Fig. 5—Drill point ground for thin sheets; 6—Jig and interchangeable drill bushings; 7—Method of removing studs; 8—Drilling square holes; 9-10—Drill and reamer for hard non-metallic materials; 11—Cutting smooth surfaces; 12—Measuring viscosity; 13—Twisting stranded leads; 14—Reclaiming worn boring bar pilots; 15—Salvaging abrasive discs; 16—Welding and brazing shunts.

This interesting development was one of more than a score of new engineering advances recently disclosed by Westinghouse Electric & Mfg. Co. Such revelations illustrate the willingness of many big companies to share their highly specialized "know how" with all American industry during this national emergency, as pointed out by Dr. A. A. Bates, who directs chemical and

TWO TOOL STEELS CAN CUT AS CHEAPLY AS ONE

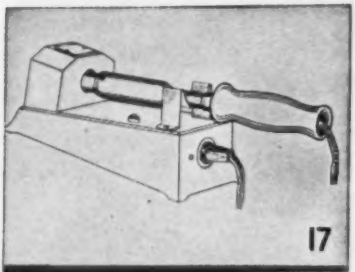
WHAT'S more important, two tool steels can cut twice as *fast* as one, and speed is the prime urgency in war production.

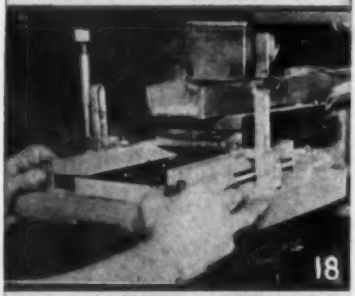
But there are ways of increasing production beside installing more modern types of machine tools. A better tool steel, or one better suited to an individual job, can materially speed up the work your existing equipment is capable of doing.

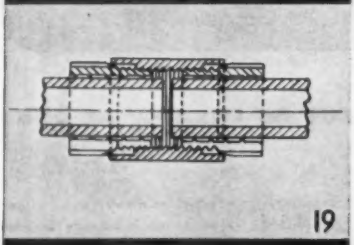
Take the case of a big Detroit plant, using DBL High Speed Tool Bits instead of a high-tungsten variety, machining castings of X-1340 steel with a surface hardness of 33 Rockwell C, and a subsurface hardness of 26-28C. The DBL Tool Bits showed 30% increase in work done between grinds, running at 166 RPM against a previous speed of 100 RPM.

Our Service Staff is ready to help you team up tool steels with your production jobs, for more work done per machine. They'll show you the best *alternate* steels, too, as a precaution in keeping the lines moving.

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA







metallurgical work at the Westinghouse Research Laboratories, where many of the technical advances were discovered.

The real problem, he emphasizes, is to provide means for the common interchange among industries of such ingenious discoveries and new techniques, so they can be put to use in the thousands of small factories which are working day and night on war production. Many of these new ideas are shown in the accompanying illustrations.

Fig. 5 offers a helpful suggestion for drilling thin sheets, with less burr and improved chip clearance. As shown, the drills are ground with a flat spur point and are said to show marked advantage over drills ground in the conventional manner.

Fig. 6 offers first aid for the drilling of a variety of holes. The stated advantages include more accurate drilling and reduction of drill breakage. Bushings for accurate guidance of drills from ¼ to 1¼" diameter are held in the fixture attached to a V-block. The jig holds stock up to 4" long and bushings are interchangeable. Tightness of twist is controlled by setting of collar behind the spring.

Fig. 7 shows an approved method of removing broken studs or taps, which saves time and material, at the same time reducing scrap. A nut is arc welded to the end of the tap or stud broken off in the casting or fabricated part. This nut is of the same size as the broken piece and is filled with welded metal to make a solid unit. Flux from the welding rod prevents "freezing" to the casting surface. This method is reported to be successful in removing taps as small as 4-40, and its

THE ILLUSTRATIONS—

Fig. 17—Preventing soldering iron burnout; 18—Attaching plastic trim to metal parts; 19—Pipe connector; 20—Testing electrical circuits.

I'm Tellin' You..

Head Stock — Don't let oil level get below one inch from top of intake. Use a good grade of machine oil SAE 30.

Tailstock — This top unscrews. Keep the felt filtering pad saturated by daily oilings from a can.

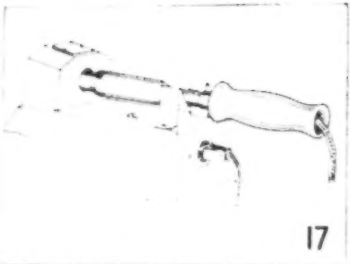
Apron — Keep SAE 30 oil at a level where it can be seen at intake. Work plunger in and out slowly 3 or 4 times daily.

Feed Box — Keep the felt filtering pad in the trough saturated by daily oilings from a can.

THE R. K. LeBLOND MACHINE TOOL CO.

Cincinnati, Ohio

Largest Manufacturer of a Complete Line of Lathe



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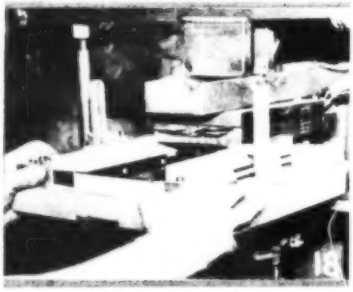

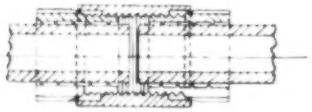

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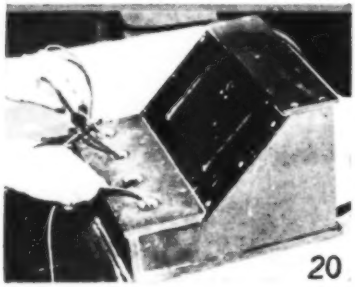

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I'm Tellin' You..

(No. 1 in a series of tips on "Keeping 'em Turning")

I've been building LeBlond Lathes for about 36 years now. I know that they're rugged and will put up with a certain amount of abuse. But this is no time for an operator to see how careless he can be. You young fellows who are maybe new at running a lathe—and you old hands who sometimes forget, have a listen to a guy who should know some of the tricks to "keep 'em turning."

NOT THIS WAY

First off, in setting up a new lathe *read your instruction book.* We put an awful lot of care into a LeBlond to get the accuracy shown on the inspection test card. But we might just as well spend our time fishing if you miss on getting it set up level. An ordinary carpenter's level won't do — it's not nearly sensitive enough. It takes a precision ground bulb level. You also want to use this instrument to check the alignment of the older machines from time to time.

After you are set up according to the book, study the lubrication chart. This is important. Look at the pictures below. These are the spots that need oiling every day.

Chester G. Ralston

Head Stock – Don't let oil level get below one inch from top of intake. Use a good grade of machine oil SAE 30.

Tailstock – This top unscrews. Keep the felt filtering pad saturated by daily oilings from a can.

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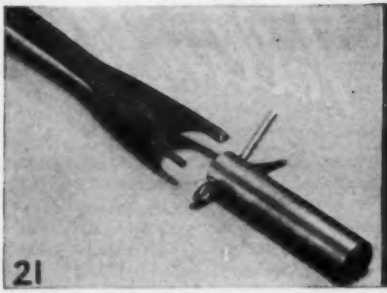


Fig. 21—Here's a simple tool for opening cotter pins; Fig. 22—A simple method of illuminating inaccessible recesses.

practicability depends on the value of the casting or fabricated part from which the removal is to be effected. A similar method was advocated recently by the Lincoln Electric Co.

Fig. 8 reveals a practicable method of drilling a square hole, saving time and assuring more accurate work. Work is placed under the cylindrical guide with the square hole in top. A hole is bored thru the piece and a triangular cutting tool is used to follow the contour of the square guide. A drill press or a lathe is used to rotate the special chuck.

Figures 9-10 show a method of drilling or reaming brick, glass transite and other non-metallic materials. Drilling time is reduced, holes are more nearly true to size and tool life is increased over other methods.

Fig. 11 presents a method of cutting smooth surfaces, eliminating gaskets and saving time. It will be noted that one cutter tooth extends .020 to .030" beyond the other teeth. This tooth cuts along the entire edge and literally shaves the metal. Thickness or amount of feed is but a few thousandths depending on cutter speed and area of surface. Cutter bearing must be rigid to prevent work from vibrating.

Fig. 12 shows a quick and fairly accurate method of making viscosity control tests. A funnel-shaped cup of fixed weight and orfice is dropped into liquid whose viscosity is to be compared with a standard. The time in seconds required for the liquid to flow up thru the orfice until the level reaches a pin inside the cup is taken as a measurement of viscosity.

Fig. 13 shows equipment for twisting stranded wire leads prior to soldering which speeds production and provides uniform twist. The attachment shown is mounted on the shaft of an ⅛ to 1/16 hp motor and it has grooved jaws to hold the wire. These jaws are normally closed by a spring and are opened by a foot lever. Motor speed is 1725 rpm and a production of 40 leads per hour is possible.

Fig. 14 covers a method of reclaiming worn boring bar pilots. Four pads of hard facing electrodes are arc welded to the worn pilots. The deposits are ground to the required diameter. Low portions between the welds provide clearance for chip removal and aid operation. This expedient is useful when the diameter of the pilot is sufficient to allow for the necessary machining to accommodate the hardened bushing without interfering with the set-screw.

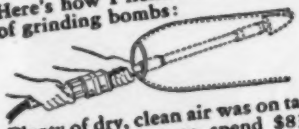
In Fig. 15 you'll find a method of extending the life of abrasive discs. The device comprises a turntable, cut-

BOUT of the O'TOOLS

ROUND 8

WAR WINNER'S REPORT
TO: Uncle Sam

Here's how I licked the problem of grinding bombs:



Plenty of dry, clean air was on tap. They didn't have to spend $832 for a HIGH-CYCLE converter. Gave them a 26" extension grinder to reach inside the bombs (see sketch). This was 5 lbs. lighter on a power-for-power basis than my HIGH-CYCLE opponent. Since the job required a lot of in-and-out handling, my lighter weight and simplified build got the decision to turn out the bombs faster.

AIR O'TOOL

(Winner, Round 8, Bout of the O'TOOLS)

"AIR" *helps us get at* TOKYO

Here, Rotor Air Grinders licked a problem of getting at the burrs inside bombs—to help U. S. bombers get at the Tojos inside Tokyo.

To make sure this grinding job would be done as thoroughly as the bombing job to come, the Rotor Analyst let AIR and HIGH-CYCLE decide which could turn 'em out fastest. Guesswork is out when the O'Tools have it out!

AIR won this Round 8. See his report.

Are you getting the kind of results from portable tools that can whip the Axis? Call in the unbiased Rotor Analyst to blast away the obstacles.

KEEP 'EM RUNNING! Get your free copies of the booklet and wall chart on maintenance of portable tools.

AIR

HIGH CYCLE

ROTOR TOOL

THE CLEVELAND, OHIO

Fig. 23—A 110-volt electric heater, inserted in the end of huge turbine bolts, makes it possible to tighten them without producing torsional strains.

ter and centering pin and it cuts about 1" from the outer edge of abrasive discs. The discs are then cleaned with naptha to remove grit and the abrasive grains cut with the effectiveness of a new disc. A punch press may also be used to cut down the discs.

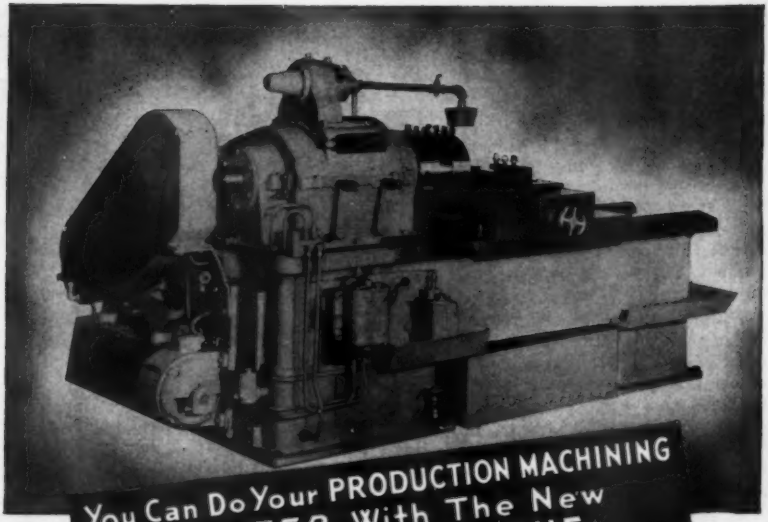
A method of welding and brazing shunts which cuts the cost of labor and eliminates drilling and bolting is shown in Fig. 16. The shunt is welded or brazed directly to the current carrying part. Flexible stranded shunts of copper wire, of the order of .008" may be welded without flux; otherwise phos-copper flux is used. The welding machine has an automatic timer and an air cylinder.

Fig. 17 reveals a method of safeguarding soldering irons, increasing their effective life and maintaining the required uniform temperature. When not in use, tip of the iron remains in the housing. A thermostat control in the housing opens the circuit when the iron commences to overheat. The holder is used in two sizes—for less than 1" and from 1 to 1⅝".

A method of attaching plastic trim to metal parts is disclosed in Fig. 18. Method of operation is similar to that of hydraulic molding press. The heated plate carries heating coils. A removable fixture clamps plastic to metal. An air cylinder raises parts into contact with the heated plate. Space heaters and thermostatic control are also provided. The fixture exerts a pressure of 50 lbs on each stud at 285 F. From 15 to 20 seconds is required to heat and form the plastic stud properly.

A method of connecting pipe which eliminates threading and saves time

Fig. 24—Demonstrating the principle of the magnetic flow detector, C. S. Williams of Westinghouse Research Laboratories, magnetizes the revolving ring of steel. When used in production, an automatic machine provides four stations:—(1) loading; (2) demagnetizing; (3) d-c polarizing; and (4) scanning. The spindles would turn continually and the table index periodically.



You Can Do Your PRODUCTION MACHINING *FASTER* With The New NORWOOD LATHE

Send For These Detailed Engineering Data Units

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...For Faster Production Machining

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THE NORWOOD ENGINEERING CO.
94 No. Maple Street, Florence, Mass.

is disclosed in Fig. 19. A malleable iron sleeve fits over pipe ends. Nuts on each end, when tightened, compress a rubber gasket around end of each pipe. The joint is said to stand a pressure of 150 psi, handling oil, gas, air heater, water and other fluids.

A way of speeding up the testing of electrical circuits is revealed in Fig. 20. Unstripped circuit wire is dipped in mercury wells or electrolytic salt solution in contact with walls, conducts current for testing shorts and open circuits.

Without proper tools, the humble cotter pin can waste valuable production time. The tool resembles a screw driver blade and is cut to provide two prongs. One prong is rounded to fit cotter pin eye. The other prong is flattened to facilitate opening of the cotter pin ends. Heat treated tool steel is used for the tool.

A handy method of lighting deep holes and other recesses, aiding inspection and machining operations, is disclosed in Fig. 22. An extension attached to a flashlight, consists of an 18" insulated copper wire inside an aluminum tube. Male threaded part on one end of tube screws into the regular bulb socket. The opposite end carries a bulb socket. The extensions are flexible and may be straightened without injury.

"Putting the Heat" on Big Bolts

To avoid torsional strains, the huge alloy steel bolts for high temperature, high pressure Westinghouse turbines are tightened by means of electric heaters. To insure they have been properly tightened and that the bolt is stretched just enough to produce the desired stress, these big bolts have holes down their centers for measuring length of the bolt before and after heating.

In practice, the nut is tightened on the cold bolt until it is snug. With the nut snug, the 110 volt electric heater is inserted in the hole thru the center of the bolt and current turned on. Heat causes the bolt to lengthen. It requires about 5 minutes per inch of bolt diameter for bolt to elongate enough for nut to be given a pre-determined amount of turn. Heater is removed and the bolt is cooled quickly by compressed air to minimize flange expansion. A special micrometer is used to check stretch of the bolt, which is a measure of the desired stress. The permissible tolerance on the measured lengthening is minus 10 per cent to plus 20 per cent. Fig. 23 shows heater inserted.

Magnetic Flaw Detector

Heat treated parts—like bearing races and similar cylindrical objects—are inspected for under-surface flaws by a simple magnetic method developed by P. H. Brace and C. S. Williams of Westinghouse Research Laboratories. In addition to speed and accuracy, this electromagnetic test for flaws requires no contact with the inspected part and performs its task without marring or denting polished surfaces.

When a symmetrical piece of steel is properly heat treated and then magnetized, the external magnetic field is uniform. However, any defect in the heat treatment, such as a hard or a soft spot, changes the permeability of the faulty region and the magnetic pattern. In actual testing, the heat treated part is first demagnetized completely to wipe out all traces of residual magnetization. The piece is next rotated at high speed, and at the same time strongly magnetized, so that the flux extends outward from the surface being tested. Finally this flux is explored with an electromagnet consisting of an alloy bar surrounded by a coil. Variations of the magnetic field induce a voltage in the coil, which is amplified and indicated by means of oscilloscope. The test piece is rotated synchronously

A precision built instrument for testing the hardness of hardened and soft steel, non-ferrous metals and metal alloys, by penetration; calibrated on the major load of 150 Kg. which consists of three calibrated weights (60 Kg, 40 Kg, and 50 Kg) and on the minor load of 10 Kg, thus being able to make either direct or conversion hardness readings.

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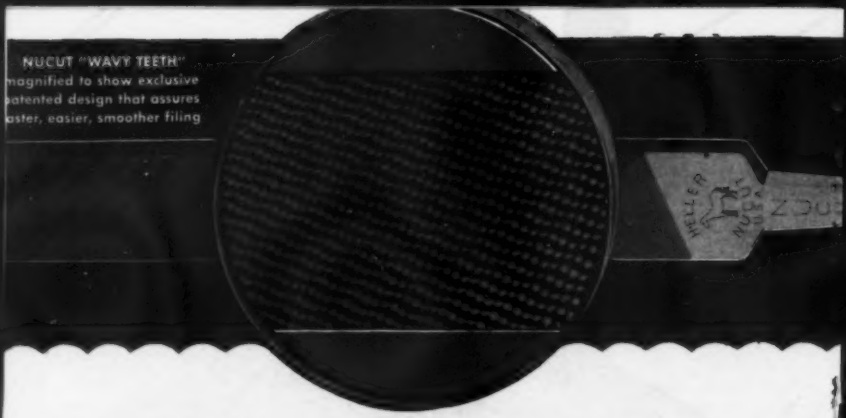

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SQUARE
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with the cathode-ray sweep, so that a uniform field is traced on the tube screen as a luminous straight line, but faults show up in the oscilloscope trace as dips. A second trace on the tube screen acts as a reference line and carries 12 index points, corresponding to 30° angles around the test piece. By this means, a fault can be spotted on the periphery within a few degrees.

Altho the oscilloscope affords only a visual indication of the fault, it is possible to add a relay system to give an audible signal by means of a bell or buzzer, or even to operate automatic machinery for segregating defective pieces coming from a production line. Fig. 24 shows the process.

Compressed Air Film Doubles Stamping Production

Stamping production is doubled and rejects are cut down considerably in punch press operation by the simple expedient of blowing air down thru a ¼" hole in the upper die at Westinghouse Lighting Division, Cleveland. When the air is shut off, the stamping falls into the hand of the operator thus eliminating scratches and the necessity of prying it loose from the lower die.

As part of a manufacturing process, pieces of aluminum as thick as ¼" are stamped out in a punch press. Formerly, it was difficult to eject the stamped pieces without harming the finish and slowing down production. Usual methods of ejection could not be used. Vacuum cups proved impractical.

A solution was found in the application of the inverse relation of air pressure to velocity, such as used in the simple trick of blowing on a piece of cardboard under the end of a wooden spool. The cardboard disc with a pin thru it to prevent side-slip is placed over one end of the spool, and no amount of blowing thru the other end can blow it away even tho gravity would seem to let it drop. The air leaving the spool at high velocity strikes the disc and escapes between spool and cardboard. The escaping air must overcome inertia and friction and this causes a reduced air pressure on the spool side of the disc. Result is a balance of atmospheric pressure against gravity such that the disc

Fig. 25—Stamping production is doubled in this punch press by the simple expedient of blowing air down thru a ¼ hole in the upper die. When the air is shut off, the stamping falls into the hand of the operator thus eliminating scratches and the necessity of prying loose from lower die.

"floats" on a plane very close to that of the spool.

This idea was applied to the problem of removing the stampings. An 80-pound air line was connected to the press, and air blown thru a ¼" orifice drilled in the upper die. Air pressure is applied and controlled from the crankshaft simultaneously at start of the up-stroke of the stamping motion. When the stamping operation is completed, the reduced atmospheric pressure above the metal piece causes it to rise with the upper die. The air pressure is then released, and the plate drops into the hands of the operator. Fig. 25 shows details.

Hollow Drill Speeds Micro-Sampling

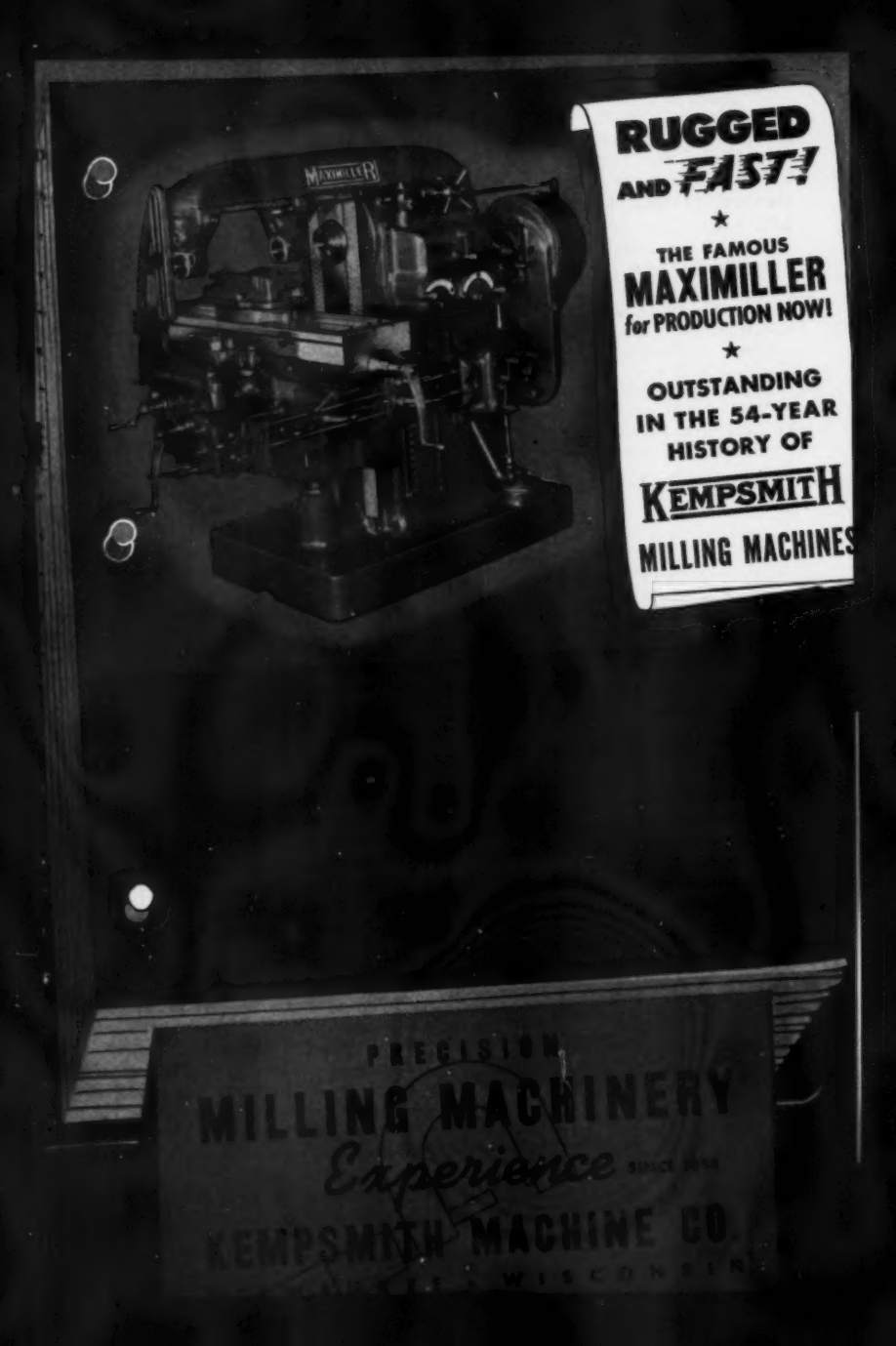
Much time is saved by using a tubular drill for extracting solid test samples from castings, forgings, rolled and welded parts at East Pittsburgh. In addition, it is usually possible to sample without weakening the part being tested, and also the surface material (one end of the cylindrical sample) is preserved for inspection. The method replaces the slow and laborious procedure so commonly used to saw out specimens for microscopic analysis.

Fig. 27—Sample is inspected by mounting in plastic such as lucite or moldarta and grinding and polishing diametrically or longitudinally. Component parts of the drill unit include: — tubular drill, spring, centering pin, and ordinary twist drill as shown.

Fig. 26—Much time is saved by using a tubular drill to remove a solid piece sample from this 50-ton crane hook.

Essentially a tubular member having a number of cutting teeth at one end, the drill contains a removable centering device consisting of a pin and spring inside the hollow shaft. Held in the chuck of an ordinary stationary or portable air, electric, or hand drill, no jigs are required and the drill is operated in the conventional manner. (See Figures 26-7).

To use, a pilot hole approximately ⅛" diameter and ⅛" deep is made with a standard twist drill. The tubular member is then clamped in chuck; with the spring and the centering pin placed in the tubular member. The centering pin is positioned to extend beyond the drill teeth and the nipple is inserted in the pilot hole. When the drill has cut into the piece about 1/16", it is withdrawn to permit pin and spring to drop out. Drilling is then resumed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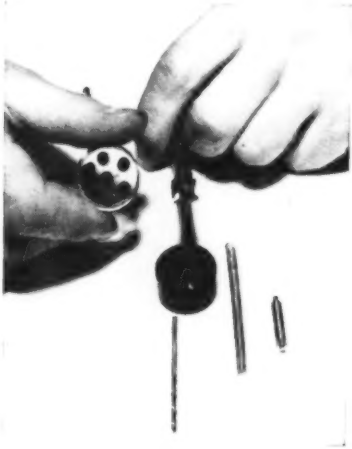

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to the desired depth; the solid core formed inside the tubular shaft is removed from the part by flexing until it breaks off at the base.

Brazed Strippers Lengthen Die Life

The life of metal stamping dies is increased and the quality of stampings is improved by a simplified method of making die strippers at the East Pittsburgh Plant. Other advantages include, stripper accuracy equal to that of the die and a lower manufacturing cost.

A stripper has an important bearing on the overall performance of the die. For example, in making motor laminations, the clearance between punch and die is usually in the order of .001". and the stripper must fit almost as accurately as the die itself. Formerly the stripper was made of one piece by laying out, jig boring, sawing, and hand-filing the slots. Such operations have the hazard of causing non-uniform clearance in slots—a factor that hastens wear of the die.

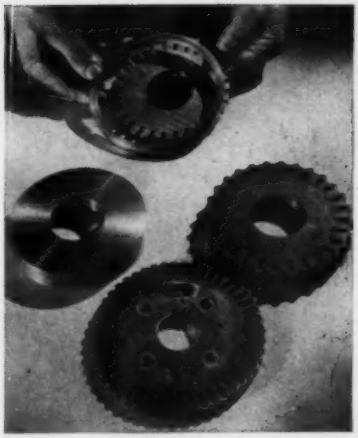

Fig. 28—Die life is increased and quality of metal stampings improved by machine-milling instead of the usual hand working of stripper slots. Disk is slotted into spider, and outer ring is shrunk to it and copper-brazed in a controlled atmosphere furnace and ready for use. A one-piece hand-filled stripper made by the old method is shown in the foreground.

By the new method, a disk of the proper grade of tool steel is machined to the outside diameter of the slot edge, and equidistant slots are cut on a milling machine using a ground form cutter. An outer ring is shrunk to the milled piece and copper brazed in a controlled atmosphere furnace, as revealed in Fig. 28.

Fig. 29—A continuous sample of the purified hydrogen gas (in by hose at top, out by hose at base) for heat treating steel in atmosphere furnaces flows thru this 2-element tube.

Guarding Furnace Atmosphere

To increase production and safeguard quality of steels treated in atmosphere furnaces, a special tube developed by Westinghouse Electronic research engineers provides a continuous check on purity of the hydrogen gas flowing over the metal. Such scientific control is especially important where dew point of the treating gas must be maintained in the critical region of -40 C to -70 C,

nter Scope is an optical locating tool
45x magnification. It has a broad
ld and guide lines for centering. It
a be used on any machine tool and
ovides an easy method to compen-
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AN ERROR TODAY IS SABOTAGE!

"Time out" to correct an error may cost the lives of many men. None of us can afford to have the finger of guilt pointed our way for not having done our job *right* the first time—here at home on the production front!

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Center Scope has many advantages of which price is vitally important. You can get your Variable Center Scope for only $97.00, f.o.b. Los Angeles, California. The Edge Block is $23.00 additional. Orders are filled promptly.

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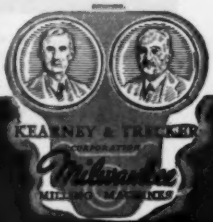

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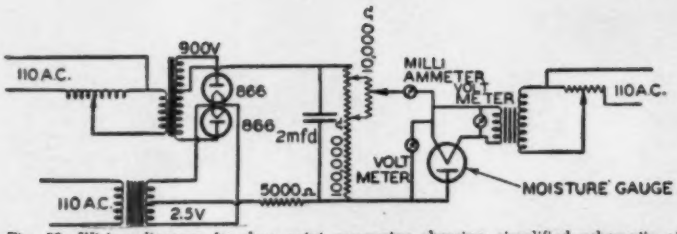

Fig. 30—Wiring diagram for dew point apparatus showing simplified schematic of connections. The milliammeter in the plate circuit indicates when moisture or oxygen flows thru the detector tube. The unit can be made recording or automatic in control.

or for precise furnace conditions such as required for bright annealing, and for chemical processes, using purified dry hydrogen or similar controlled gases.

To give the metal proper characteristics, steel is often heated in an atmosphere of highly purified hydrogen that is practically free from moisture and oxygen. Ordinarily, to measure moisture in the gas where dew points are less than 0° C, a cooled and polished metal plate is inserted in the gas stream and the temperature noted when condensation of moisture first occurs. However, below -40 C this method becomes largely guess work and even skilled testers disagree on values of the same gas. The electronic method, insures reliable and accurate determination of moisture and oxygen content in hydrogen (or disassociated ammonia) gas.

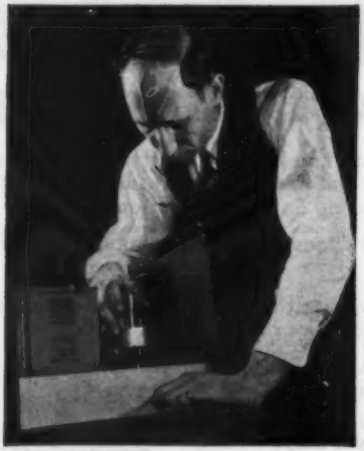

Fig. 31—Production "Watchdog"—P. R. Kalischer, Westinghouse metallurgist, inserts in its socket a new electronic tube he has developed as a "watchdog" of production to help reduce spoilage of parts for airplanes, tanks, guns and other machines.

In operation, the gas flows thru a 2-element tube containing a tungsten filament and plate. Electrons flying from the hot filament to the plate continually bombard the gas. If the gas is pure dry hydrogen, all the electrons reach the plate. But any oxygen or water vapor in the gas, immediately picks up some of the electrons and forms negative ions, thereby reducing the electron current. This change of current in the plate circuit indicates the degree of impurity in the gas.

The tube and the circuit are shown in Figures 29 and 30.

"Electrical Weatherman"

Invention of a new tool to reduce spoilage of war machine parts, an electronic "weatherman" that discovers moisture in gases 1,000 times as dry as outdoor air on an average sunny day, has been developed by Westinghouse Research Laboratories. Fig. 31

Fractional Grades — Controlled Porosity — H9 Vitrified Bond — new improved hydraulic presses — additional scientifically controlled tunnel kiln — constant, rigid laboratory check of raw materials . . . These important steps by BAY STATE assure you of a continued supply of only "thoroughbred" abrasive products to help win your race for better delivery dates and our ultimate Allied victory.

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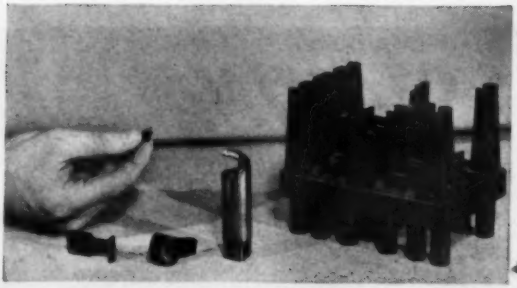

Fig. 32 — These molded parts are illustrated, left-to-right in the order listed—right angle piece, button (held in hand), scroll, scroll die, relay base.

shows P. R. Kalischer, Westinghouse Metallurgist inserting one of the new tubes.

Essential part of the new "electrical meteorologist" — called an automatic dew-point recorder—is an electronic tube resembling the tubes in the ordinary home radio receiving set. The importance of this product lies in its ability to discover as little as four thousandths of one per cent water vapor in furnace gases used to heat-harden tough steel airplane, tank and gun parts.

"The recorder 'keeps watch' continuously over these gears," explained Philip R. Kalischer, metallurgist who developed the device. "It does its forecasting by indicating the exact moment the furnace gases become too wet. This close check is imperative since flow of wet gas to a furnace for only a few minutes might ruin a whole batch of carefully machined parts by softening and rusting their surfaces," Mr. Kalischer continued. He explained that softening is caused when oxygen in the wet gas combines with the steel's carbon—its hardening agent.

Moisture in heat-treating furnace gases is now measured by inserting a cold, polished metal surface in the gas stream and observing the temperature at which a mist-like film of water forms on the polished metal. From this temperature, a skilled technician calculates the water content of the gas, a method that is accurate only within 8 or 10 degrees at low temperatures, and requires 10 minutes of the technician's time at least once an hour.

The new electronic recorder is accurate within one degree of temperature and, since it is automatic, frees the technician for other work, Mr. Kalischer said. It records its discoveries on a meter which can be read even by an unskilled workman.

All steel machine parts that must withstand wear require hardening in heat-treating furnaces thru which such gases as hydrogen are forced to exclude air. This is necessary because air ordinarily contains 20 per cent oxygen—enough to rob hot steel of carbon needed in the hardening process—and sufficient moisture to rust steel at high temperature, Mr. Kalischer explained. He added:

"But even with this technique, moisture cannot be entirely excluded from the furnaces since traces of oxygen present in the gases combine with the hydrogen to form water vapor. To overcome this obstacle, blotter-like drying agents such as aluminum hydroxide are placed in tanks thruout which the gases flow on their way to the furnaces.

"The dew-point recorder tells when the gases need such drying, and it also tells when a drying tank becomes sat-

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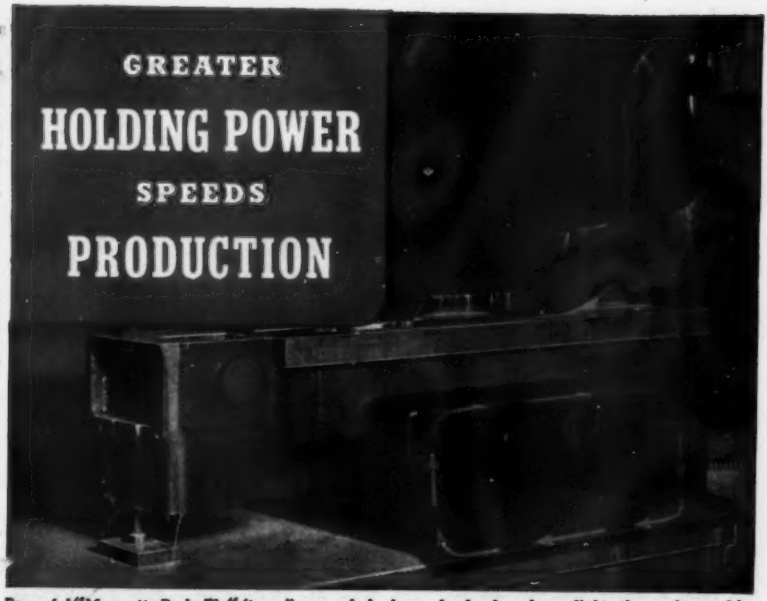

Powerful "Magnetic Body Flo" (in red) securely locks work, chuck and parallel to the working table.

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"Magnetic Body Flo" is the principle involved in holding work with the ANDERSON & BROWN Magnetic Chuck. The magnetic flux flows through the work, the parallel and back to the chuck through the working surface of the grinder, locking all elements tightly together.

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Discover how the quick set-ups and other advanced features of this chuck can save you time and money. Send for your copy of "Magnetic Chucking Revolutionized".

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urated and will absorb no more moisture. The furnace gases must be then routed to a new drying tank."

Contents of the recorder's tube are similar to a radio rectifier tube, which is used to transform a-c to d-c. But the radio tube contains no gases, whereas gas from the heat treating furnace flows continuously thru the recorder's tube.

Mr. Kalischer explains that electrons (negatively charged electrical particles) travel from the tube's hot filament to a metal plate. As long as dry gas passes thru the tube, electrons flow steadily, producing an unvarying electric current in an external wire circuit. But when water vapor is present in the gas, some of the electrons adhere to the water's oxygen atoms, reducing the electric current. By measuring flow of current, a meter indicates the moisture in the gas.

"The new recorder has several advantages over present methods," Mr. Kalischer explains. "It is more accurate, it is automatic and everyone who can read a meter can operate it."

Precise Dies for Plastic Parts

Ingenuity in the construction of molds to meet exacting requirements for plastic parts has enabled the Westinghouse mold-making department to increase production of dies 400% during the last year. These molds have provided an inexpensive speedy means of production for intricate Moldarta parts often required in quantities of many thousands. Listed are several typical problems encountered and the methods used to assure accurately shaped parts. Some of the parts are shown in Fig. 32.

Hardening Distortion Overcome with Pre-Heated Insert — First attempts to drift on the end of a right angle piece failed as distortion in the heat treating of the die caused this drift to be nullified. A small insert with this 0.002" step was hardened separately and then fitted into main die. This change in the die design proved to be the correct solution.

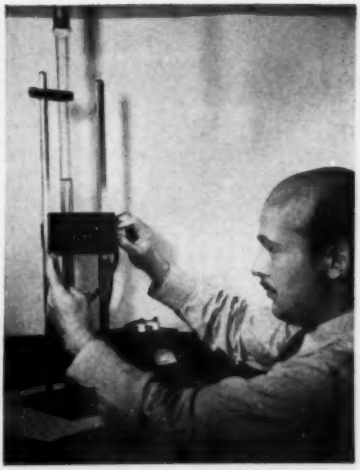

Fig. 33—Dr. A. A. Bates of Westinghouse Research Laboratories adjusts the photocell that quickly and accurately indicates size of metal particles used in powder-molding.

Multiple Cavity Uniformity Maintained with 0.008" Radius—A tiny "button" is made in a 24 cavity mold, with each cavity precisely the same as the rest. The point of junction for the eccentric diameter must be held in an 0.008" radius assuring both necessary strength and proper clearance. In order to fulfill these specifications, the top die of the mold, which forms head of the button, is hobbed or cold pressed from a master. The bottom dies are bored in a lathe and then counterbored eccentric with a series of special built drilled blocks, gun drills, and reamers. The 0.008" radius is drifted on this eccentric diameter by means of a master drift which assures the same radius for all the cavities. In final inspection when this 0.008" radius is magnified 65 times, the uniformity of all pieces is established.

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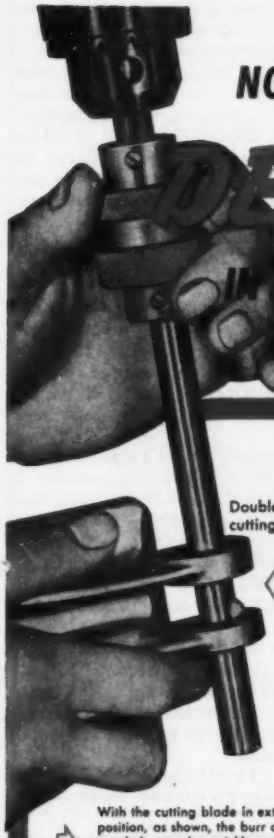

Double-edge cutting blade

With the cutting blade in extended position, as shown, the burr around any hole may be quickly removed. Sliding the knurled collar upwards retracts the blade to within the diameter of the shaft and the work may be removed or moved to a new position and the blade re-extended.

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Replica ⅛ Size Taken from Wood Model—Because of the difficulty of putting this design on paper, it was necessary to machine the scroll die as a reduced duplicate of a model 8 times normal size. The proper curvature and shape was accomplished by filing this center core and constantly checking against the model until a similar form was reached.

Close Fitting of 21 Separate Parts—The various shaped parts on top of a relay base were formed with a total of 21 separate die parts. Perfect fitting of the mating parts was necessary to avoid heavy fins being formed on the molded piece. A loosely fitted job or mold assembly would have resulted in dimensional inaccuracies of the piece.

Powder-Molding

Using only a glass tube, a photocell, a light source, and a milliammeter, P. R. Kalischer, Westinghouse research metallurgist, can determine grain sizes of metallic powders as small as 1/25,000" in about 1/30 the time usually required for such an analysis. Since the quality of a metal part produced by powder molding is dependent on uniformity of the metal grains, this determination of particle-size distribution is especially important. Fig. 33 shows Dr. Bates adjusting photo-cell.

Photocell and light source are mounted on opposite sides of the glass tube, and the output of the photocell is read by the milliammeter. To analyze a powder specimen, Kalischer mixes 1 gram of it in the tube with 100 cubic centimeters of acetone, to which a small amount of a wetting agent (isopropyl xanthate is one of the best) is added. The tube then is clamped between the photocell and light source. As the particles settle, the liquid clears and transmits more light to the cell.

From timed readings of cell current a time opacity curve is plotted for that specimen. By comparing this curve with similar curves for standard powders of known particle size, Kalischer can determine both average particle size and relative quantities of particle of different sizes in the test specimen.

The usual method of measuring particle size is to float the powder in glycerine and measure the settling time. Such a test requires about 8 hours, and does not give accurate information about relative quantities of grains of different sizes. The simplified Kalischer method takes only 15 minutes.

Use of a wetting agent is important, because it helps the acetone to surround each metal grain completely. Without it, the settling rate might be affected by tiny air bubbles surrounding the grains.

(Illustrations — Courtesy Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.)

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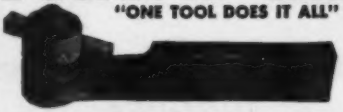

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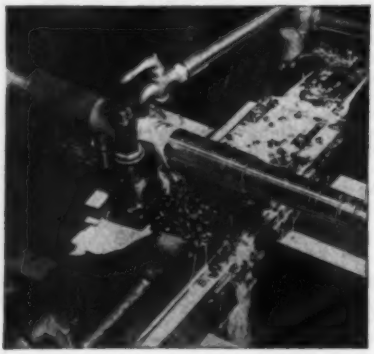

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3 Turn multiple diameters.

4 Remove work from lathe.

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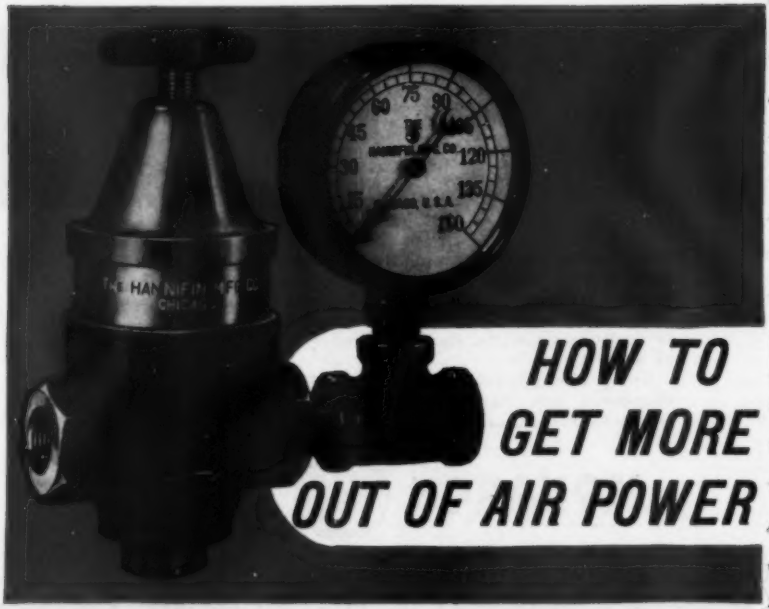

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Dial Indicators Deserve a "Break"

By I. A. HUNT

FAITH in the accuracy of yard sticks seems to be a natural human weakness. An inspector carefully checking the precision parts of an aeroplane motor, may think such a statement applies only to the thousands of new inspectors, who only a few short months ago, never held gages in their hands more accurate than wooden yardsticks. Yet frequently, even he is relatively just as thoughtless in his conception of Dial Indicators and Dial Indicator Gages, and in his application and use of them.

One of the most common misconceptions is that a Dial Indicator is to be used only on the finest of precision work. The fact is, that altho they are used on the most exacting inspection requirements, the reason for their being used more and more extensively is because they speed up inspection, and eliminate human variations in the sense of touch. It is a fact that one of the most frequently used Dial Indicator Gages, (Fig. 1), is graduated in either .01" or .001" and that more .01" gages are in use than .001". Why? Simply because it is such a simple, fast and convenient gage to use. Even tho it is not an extremely accurate gage, it produces more uniformly accurate inspection than other available types of gages made for the same purpose.

Even tho a tolerance may be comparatively liberal, it is important to know—in these days at least—**quickly** and **positively** whether the finished di-

Fig. 1—One of the most handy of Dial Indicator Gages, even tho it is not the most accurate type.

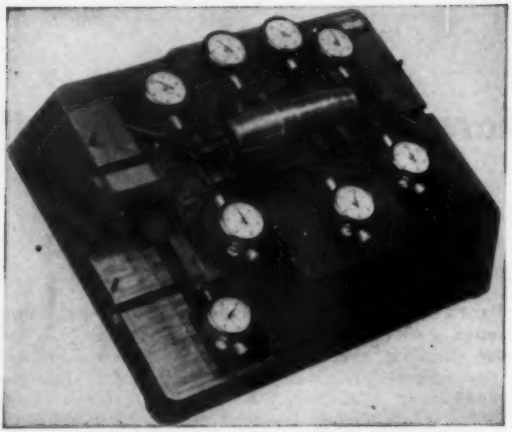

Fig. 2—Inspecting concentricity of both inside and outside diameters simultaneously.

mension is right or wrong. It is unsatisfactory to depend upon whether the inspectors' sense of touch is numb from too-much-of-last-night, or from just being too tired at the end of the shift.

Another important factor in the interest of speed is multiple, simultaneous inspection. This seemingly obvious time saving means of inspection is only partly appreciated. Yet, why laboriously inspect several diameters one at a time when all of them can be quickly and more accurately checked at once?

A Dial Indicator is a complete unit in itself, and can be mounted singly or several may be so located as to contact the workpiece at the several points to be gaged and so inspect all dimensions at once. More frequently than not, some of these dimensions bear a definite relation to each other and such simultaneous inspection offers a simple solution of the requirement. Such a typical case is found in checking the concentricity of shells, (Fig. 2) where it is important that the various outside diameters of the shell be concentric with each other and even certain inside diameters must be concentric with the outside diameters. The illustration shows a Dial Indicator Gage which furnishes a fast and accurate means of inspecting—outside diameters and three inside diameters for concentricity all at one setting. Diameters themselves can be inspected simultaneously and at the same time as independently of each other as tho each diameter were checked separately on a single purpose,

Fig. 3 — Another set-up for quick checking of multiple diameters.

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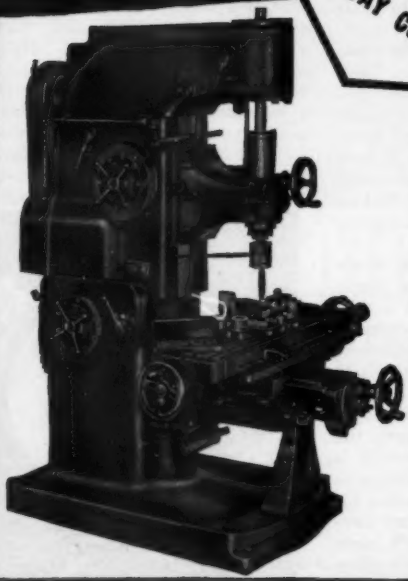

The No. 40 Knight Miller has a wide range of capacity, fitting it for many jobs and uses. Performing these 5 operations at one setting, saves precious hours of down-time on many jobs. In addition, the special swivel and tilting table features save the use of many angle plates and cutters, and special fixtures.

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Fig. 4—Sometimes holes are drilled into indicator cases without thought of the chips which may impair the mechanism.

or a somewhat similar gage. On such a gage, each unit checking each diameter is free to contact the workpiece independently of the other units.

In connection with gages which inspect several diameters simultaneously, it is worth while to point out that many gage men confuse the functions of such gages. Many cases occur where gage men believe they are checking several diameters for concentricity and diameter on the same gage.

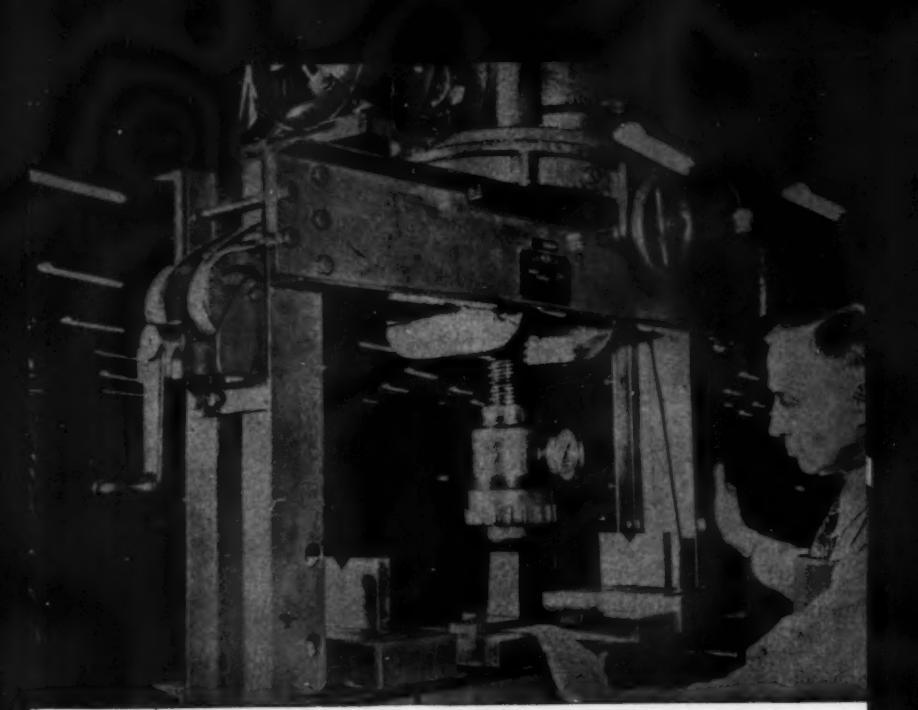
Every inspector has to check single diameters and he also checks many different sized diameters one at a time on the same workpiece. But when he attempts to place the same workpiece with several different size diameters in Vee blocks or on centers and check them **simultaneously**, he goes haywire. Very often he attempts to check the diameters the same as he would a single diameter; that is, in a comparator or similar gage. But he makes his mistake because he forgets that several diameters on the same work piece may **not be concentric** with each other and he neglects to provide a means for maintaining independent inspection of each individual diameter.

Up to here, a few more or less obvious examples of faster inspection with Dial Indicators have been pointed out, but there are other more or less obvious factors to be considered in using Dial Indicators most advantageously.

One very good example which may interest some inspectors of long experience, because it is typical of the best of them in one way or another, reverts to what was said at the beginning of this article. This is—that so long as one has a yard stick in his hand, he unconsciously thinks the yard stick is always right.

A chief inspector who was old enough and had been inspecting long enough to know better, thought exactly the same way about Dial Indicators. He thought that because he had an indicator that IT was always right. Probably this same chief inspector would most carefully check and reset his watch from time to time. He might once in a blue moon adjust the regulator, and even tho he knew he had to do this now and then, he probably would have insisted that he had a most accurate watch. But the Dial Indicator got no such break even tho it had

Fig. 5—It's a sheer waste of time to see if the pointer returns to the "at rest" position.



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been daily subjected to much greater abuse than his watch ever received.

This man had several girl inspectors checking small parts for correct sizes with gages. (These could be either the conventional fixed or solid types of gages or Dial Indicator Gages.) He had, however, set up a Dial Indicator Gage between every 2 girls to use as a master gage. About every 50th, or so piece, the girls would spot check the master gage. This is, not only inspect on her own gage, but also put it in the master Indicator gage to see if her own gage was still O.K. After this had been going on for sometime a complaint was made by the chief that the Dial Indicator on the master gage was not accurate. After all a Dial Indicator is made of materials which we all know do wear eventually, but the chief inspector just hadn't thought to check the master gage and reset the Indicator. Gage blocks are as accurate as man can make any mechanical gage, but even they wear — as do all types of gages. But there is another part to the story; a Dial Indicator Gage can be reset and continue to be used even tho contacts and parts may wear, and long after older types of solid or fixed gages have lost their correct sizes.

I was once called in by a tool engineer to "find out what was wrong" with an Indicator. It was mounted in a test set placed on the ways of a cylindrical grinder, and the complaint was, "that the Indicator would not read accurately." The Indicator, however, was quite alright but it was a large 3½" diameter instrument and suspended on the end of a small rod approximately 10" long. (Fig. 6) It might just as well have been mounted on springs. The Indicator was entirely too large and heavy in the first place to be used on such a small supporting rod, and the rod was so long that it could not by any imagination be considered sufficiently rigid. To make matters worse, the vibration of the grinder set up a small pile driver action in the too heavy Indicator because of the too small and too long support.

This is an all too common fault among users who do not appreciate the importance of supporting an Indicator ridgidly. Some inspectors will argue that the deflection of the rod will always be the same but it just isn't—in practice.

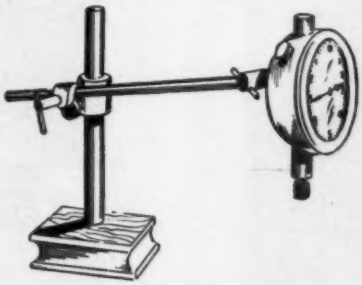

Fig. 6—An improvised mount of this kind does not provide the necessary rigidity for accurate readings.

Cases naturally occur where the Indicator is condemned as being inaccurate. In one such case after shipping the complainant several carefully checked Indicators, it developed that the foreman didn't want an accurate Indicator. He wanted one so inaccurate and so insensitive that it wouldn't show up the variations in the size of the work unless they were really serious.

Another case of a somewhat similar type involves the type of foreman who causes many a headache because of his complaints about his Dial Indicators not being stable. His complaint generally is that they do not give repeat readings, each time the same test block is passed under the contact point. Indicators, carefully tested for accuracy are furnished him, but the same complaint usually comes back,—that "they wouldn't repeat." When brought back

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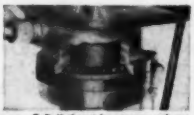

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to the plant and again tested, they repeat to within one-hundred-thousandth of an inch (pretty darned good practical accuracy).

It seems generally that such foremen and their understudies are not so accurate as they consider themselves. Often the work itself varies in accuracy so much that the very accurate Indicators show up the inaccuracies so effectively that the workmen and the foremen all consider the Indicators wrong and that the work must be right. It appears evident that they just didn't want to know the actual facts about the accuracy of their workmanship. In some cases, Indicators which were known to be not very sensitive were supplied them and strange as it may seem, everybody was happy. These men simply don't want Indicators that tell them too much. It is all very relative, this matter of extreme precision. What one man considers precise is a wide open tolerance to some other fellow.

Some foremen and chief inspectors are still really hesitant to use Dial Indicator Gages for fear they will show up the inaccuracies of the work. One such foreman remarked that he was getting away with the work as it was, and if he had an Indicator he might not be so lucky. If his tolerances were so wide open that he could get by with indifferent gages, he could still have inspected the work a great deal faster and with greater assurance.

This matter of precision often is mistreated just from mental inertia or from a case of, "not being able to see the forest for the trees." One such case occured when an inspector complained of an Indicator being inaccurate when the test block was passed under the contact from the left. The test was conducted on a "precision" surface plate with Jo blocks, the Indicator being supported on a height gage. After setting the Indicator dial at zero, the Indicator was checked in steps of five-ten-thousandths thruout the range with some queer results. When the gage and Jo blocks were moved to another spot on the surface plate other results were obtained.

A small lapped plate was obtained and the same test conducted with the result that the Indicator checked on the dot within 10% of the total range where it was off .0001", which is pretty good for any inspector's requirements. And there was no difference whether the blocks were passed under the Indicator from either left or right. Here is a case where a poor surface plate was the cause of the Indicator being suspected of inaccuracy. Human beings are apt to make snap judgments and judge many things by names and appearances only. It was a case where the inspector thought that because he had a yardstick, it must be right, only in his case it was the surface plate he thought couldn't be wrong.

Fig. 7—A properly mounted indicator should give repeat readings on a master gage block.

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Others drill and tap holes in the Indicator backs or case, letting the chips fall where they may, and then wonder why the Indicator doesn't work. A chip may not be very big but it's a monkey wrench in effect, when it gets into an Indicator's gear teeth.

There are still many Indicator users who think a test for the accuracy of an Indicator is to note whether the Indicator pointer or hand returns to its original "at rest" position on the dial just by pushing up the contact point and letting it return. (Fig. 6) This is absolutely **no test** of accuracy, and no attempt is made by the manufacturers to insure that the pointer will return to exactly the same point on the dial. However, when an Indicator is rigidly mounted in a comparator or stand (Fig. 7), and a master passed under its contact point, the pointer should "repeat;" that is, the hand **should** come to the same point spot on the dial every time the master is placed under the contact point.

But, the platen on which the master rests must be accurate, and care must be taken to exclude dirt and any other element which might affect the accuracy of the test itself.

It is a fact so obvious that it seems entirely superfluous and unnecessary to mention, that as accurate an instrument as a micrometer may be read differently by each man in a group of several. In fact, the same man may get different readings on the same work piece as many as 4 out of 5 times. On a test with 5 men, only 2 gave the same reading and the maximum variation was .00015".

A sensitive Dial Indicator, however, will repeat the same reading when mounted rigidly and if each workpiece or test piece is handled in the same way each time it is placed under the Indicator. Dial Indicators, as well as yardsticks, can be made to give inaccurate information, but with proper set-ups and use, they are less subject to human variations than gages which depend upon the less sensitive human sense of touch or "feel."

Of course, any instrument requires application as far removed from human or physical influences as possible, but it still is amazing how many forget these simple facts. Today, with the thousands of new men, foremen, and chief inspectors at their wits end keeping ahead of the pressure for more and more, it is forgetting the simple, obvious details that sometimes throw monkey wrenches into producing things as wanted.

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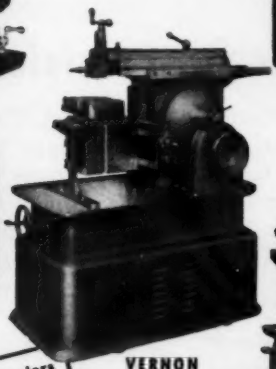

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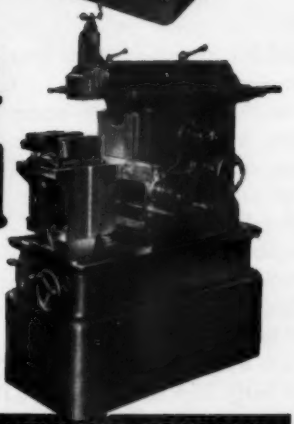

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accurate within .000008" is a necessity to provide the basic standard of measurements, from which all production starts and all measuring tools and gages, used throughout the shop are checked and set. There are large and small sets of our Ultra-Chex lines to suit all requirements. 34-block set, **$125.00 F.O.B. New York**
Note also Adjustable Snap Gages.
3. **SCHERR COMPARITOL.**
Gives accurate dependable readings in 1/10000". Gage blocks, plug gages, tools are checked for size, tolerance and wear. Mass produced parts such as bearings, pins, bushings, are rapidly checked without dependence upon the skill or "feel" of the operator. Stand. size 0—6" size .....**$195.00 F.O.B. New York**
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Quick production is not your only problem. Machine tools may be speeded up, hours saved by better set-ups, over-time and extra shifts may be installed. Yet this will be of no avail or benefit if the accuracy of your product is lost with your material ending on the scrap heap. The best investment for any shop is in inspection tools to detect and eliminate the errors at the source before they can affect production.

Give your men the right tools to measure with. Remember that whether you maufacture to close tolerances of "tenths" or to wide tolerances of plus or minus .002", you must still start with the basic accuracy in tenths of thousandths or else your work will not interchange with that produced in other shops.

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The Human Factors in Morale Building

(Part VI—Building Leadership)

By EDMUND MOTTERSHEAD

"All we have to fear is itself."
—Franklin D. Roosevelt

"LEADERSHIP"—there's a word to think about. Leadership in mass production kept American industry at the forefront in trade for years. Leadership in quality kept American products in demand. Leadership in engineering has given us the highest standards of living in the world.

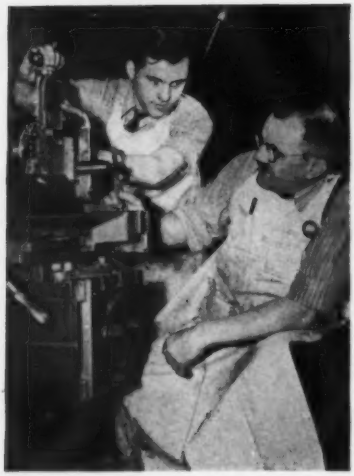
Leadership in that same quality and that same mass production will be our answer to the demands of victory. And leadership in war production necessitates leadership in handling the men who are turning out the goods.

Someone has called the foremen and leadmen the industrial "non-coms"—a good term, I think. Men who are working, many of them, 60 and 70 hours a week; men who are carrying the load of planning and supervision, of cost cutting and accident reduction; men who are the noncommissioned officers in the production army. And they have to be leaders. They must think as leaders. They must have the confidence that comes from command.

Not so long ago I visited a new plant manufacturing shell cases. In October, 1941, that plant was an almost empty shell. Today they are running three

LIKE FATHER, LIKE SON—

Many boys like 20-year old Frank Szente, (right) perform skilled tasks on the war production line right beside their fathers. Frank is one of 9 apprentices in the tool room at the Westinghouse Meter Division whose fathers are veteran employes. Frank's father, Emil Szente is showing the youth how to operate a grinder, part of the 8200-hour intensive training Frank must complete to take his place as a highly-skilled industrial soldier. (Westinghouse Photo).



IN HIS DAD'S STEPS

Twenty-year old Oscar Rissman, left, is preparing to follow in his father's footsteps as a highly-skilled toolmaker on the war production front. Oscar is one of 9 tool and diemaker apprentices at the Meter Division, who are sons of veteran Westinghouse workers. In this picture, Oscar's father, Otto Rissman, a toolmaker for 20 years, is giving the youth some pointers in the operation of a shaping machine. (Westinghouse Photo).

shifts. Beginning in a community where much of the available labor was already taken by other firms, they had to accept workers who were more or less unwanted by other plants. When I was there, they had but a single man in the plant who really knew the production end of the business. He had started as a winder, moved up to foreman, and was then plant superintendent at the end of 6 months. He was in a spot where great responsibility was placed on him. But he had one weakness—he wasn't thinking as a leader.

When someone would report that one of the cutters wasn't turning out production and the line was slowing up he'd reply: "I'll go give him ___!" His first reaction was to browbeat the worker. Not, as it should have been, to think—"Why? What's the cause of the trouble? I'll go find out and help him fix it."

Why did he react in that way? Because he lacked confidence. "Fear is begotten of ignorance and uncertainty," said Professor Robinson in "The Mind In The Making." His reaction was the result of not knowing what he could really do. He had not yet behind him a record of successful experience as a superintendent, as a handler of men. If he were completely confident of his ability to meet the emergency, his fear would vanish and he would begin to THINK as a leader.

For a number of years I have been engaged in training men in all walks of life, business men, salesmen, foremen, executives, workers. And in all these meetings, as in almost all foremen's meetings, one thing stands out:—the lack of confidence they have in expressing themselves. I recently completed a series of meetings in a training program in a large war production plant. Several of the men in the group were newly appointed foremen. Their nervousness in saying anything was pitiful. During the course of the program, each of them had to put on a demonstration of some kind, and several could hardly speak. It was not that they were ignorant or unskilled or unintelligent. It was simply that they were in a situation to which they were unaccustomed and felt unsure of their ability to handle it.

Some call it "stage fright." I call it lack of confidence. Everyone is likely to suffer from it, particularly at a crucial moment when he wants all his faculties to be at their best.

What is it? Simply a heroic attempt by the entire body to rise to an emergency . . . the only trouble being that the body goes about it in the worst

THE shop problem of producing successive runs of gears or kindred parts of different form or design is simplified by the Fellows Gear Shaper—and the simplicity with which change-over is accomplished. Generally, all that's needed is to change the cutter. And because the generated form is controlled fundamentally by the accuracy of the cutter, precision is not dependent on involved adjustments. Because of its versatility, a Gear Shaper is always busy even in the small shop. Write for a free copy of our book "The Practical Art of Generating."

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possible way to meet modern emergencies. All animal life from the beginning of time has been faced with emergencies, all more or less of one kind . . . the unexpected appearance of another animal intent on devouring the first one. And Nature seems to have given us just 3 ways to meet such emergencies . . . to flee, to fight, or to "play dead."

The modern victim of the peculiar mental paralysis we call stage fright is simply struggling to refrain from employing one or the other of these methods which really are no longer suitable. My friend, the young superintendent, couldn't restrain his instinctive reaction to fight back by saying "I'll go give that fellow ___!" Men in conference meetings often want to flee or to play dead.

The psychologist, Menninger, has advanced a very reasonable explanation of how we get that way. He says it starts with the infant. When the baby is still a few weeks old, it has no conscious realization that it is an individual apart from its surroundings. The bed is warm, it is warm; the room is full of sunshine; there is simply a single unified impression of warmth and comfort. Then comes a day it hears a loud noise, or perhaps it requires changing once too often and gets spanked for it. Suddenly it realizes that it is one thing and the environment is quite another. Then begins that sense of loneliness that is a part of us all, the beginning of fear. From that time on thru adolescence and into middle life for most of us, there is going on a two-fold process. On the one hand, there is a constant and probably unconscious attempt to return to that original sense of unity with the environment, what Menninger calls the "Original sense of 'WE' ", and on the other hand a parallel process, equally unconscious, of building up various walls or shells or defenses to protect us from shock and being afraid.

The simple truth is that we are afraid to admit we are afraid. We are afraid of losing face by admitting in public we are not too sure of ourselves, or that we might not know the answers. We are afraid of reaching out to the other fellow, afraid to try to understand him or to let him know we sympathize with him and have similar problems . . . because we are afraid we will not be accepted. And he is afraid in the same manner. Consequently, we are both suspicious and hesitant about reaching out or accepting any friendly overture.

It is the age-old business of the salesman and the purchasing agent. The purchasing agent is afraid he will buy

Pledging themselves to "Keep 'em Firing" by continued production increases of shells and other armaments, each of the 1200 employees of the Norris Stamping & Mfg. Co., Los Angeles, signed this immense scroll for secretary of the Navy Frank Knox upon being presented recently with the All-Navy "E" burgee with added star.

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THE MAN who looks ahead knows that someday he will have to switch back from war-time to peace-time production. That is why he demands *versatile* tapping equipment of *lasting* value. That is why *so many* men who look ahead are buying *Haskins* Tappers. These *standard* machines can quickly and inexpensively be set up for the new jobs ahead. They will *continue* to bring *lower costs per man and machine hour* long after Victory is won! R. G. Haskins Company, 624 S. California Ave., Chicago.

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NEW BOOKLET — "Holding Fixtures for Haskins Tapping Machines" — contains many new ideas. Send for a copy.

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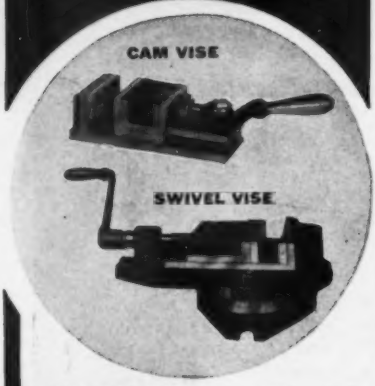

"MODERN" VISES are precision-built with hardened and ground jaws for rapid production work on milling machines, shapers and drill presses.

CAM VISES—Jaw dimensions: width 4" or 5", depth 1½", maximum opening 2" or 3".

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MODERN TOOLS

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something for too much money or get inferior quality and not live up to the requirements of his job. He doesn't want to "be sold." Consequently he builds up a resistance to most of the salesmen who call on him. He gets the reputation for being tough, for having a sharp pencil, etc. The salesman comes in and is afraid the P.A. will say "no." He he builds up a wall of bluster or smooth talk or fast talk, and tries to put on the pressure. The upshot of it is that both are nervous; both are glad when the interview is over.

The superintendent went down and told off the cutter. He didn't want to do it. But he was embarrassed when somebody came to him with a complaint some one was slowing up the line. After all, he was the superintendent, and things like that shouldn't happen in his plant. Not if he knew his business. He couldn't lose face that way.

So he "stuck his neck out" with his bluster. After which he had to go down and make good the bluster or lose his reputation for being tough. He didn't like it. The cutter was really doing the best he could. He'd only been on the job a short while and didn't really know his job yet. On top of which the new materials coming in were not up to standard, and that would have made trouble even for an experienced operator.

The cutter was nervous. After all, he'd only had the job for a week. He had to keep it. His wife was sick and they hadn't paid the rent for two months before he got this job. And now he had trouble and didn't know what to do about it. And 24 other workers down the line working against production quotas were kicking because his production was slow. So he was bawled out because he didn't know what to do. Then the "super" came over himself to straighten it out After the "super" straightened out the mess, it looked simple after all; so the cut-

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9-J Super-Speed Vertical Mill with Duplicator Table and Tracer Profiles Crankshaft Part in 15 Minutes Floor-to-Floor Time

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This is an excellent example of the ease of operation of Gorton High-Speed Millers and Duplicators in performing unusual operations.

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OPERATION—Profile Mill .738" Radius.

MACHINE—Gorton 9-J Super-Speed Vertical Mill with Duplicator Table and Tracer.

PART—Rear of Crankshaft—Steel.

CUTTERS—Special .738" dia. Ball Cutter—Profile Form Type—4 Flute.

HOLDING—Special Fixture.

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STOCK REMOVED—¼".

FLOOR-TO-FLOOR TIME—15 Minutes.

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ter went back to work, still wondering when it would happen again.

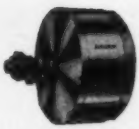
I wonder how many thousand workers all over the country are nervous every time the foremen comes around, simply because that foreman really isn't a leader. I wonder how many foremen don't think as leaders because they themselves are new at their jobs and want very much to make good and are continually nervous, hoping everything will go along all right for just a couple of hours and give them a breathing spell.

The foreman's conscious mind is attending to his contacts with the outside world, planning, managing. and supervising, leaving the bodily functions such as breathing, pumping the blood, digestion, etc., to the so-called sympathetic nervous system. In normal health this handles things perfectly, and the conscious mind is not bothered about the details.

Yet when an emergency arises, the conscious brain sends a message, "The emergency is here! Give it all you have!" And bang goes the monkey wrench. The heart pumps wildly; the arteries to the intestines shut down to a thin trickle to make as much blood as possible available for the emergency; the liver pours out high-speed fuel, the glands pump out adrenalin . . . all in preparation for terrific shock and exertion which will cause heat and profuse sweating. If the startled animal or human does actually run or fight, the energy is worked off; but the speaker approaching the platform, the man applying for a job, the salesman before the prospect, the foreman confronted with an emergency must restrain themselves and act calmly and confidently . . . which is sometimes physically almost impossible.

"People want to feel that a man in a responsible position can keep a clear brain and a level head no matter what

Machining an Anker-Holth chuck body.



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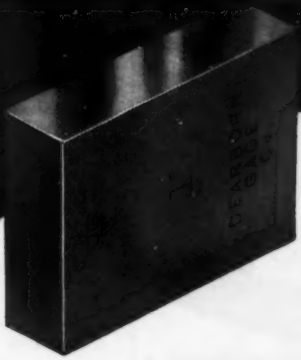
comes; that he cannot be shaken from his center, no matter what trouble may arise or how much influence may be brought to bear upon him. Can a man stand without being tripped; and if he is thrown can he land on his feet? Can he be depended upon under all circumstances to do the sensible thing? Does he lose his temper, or can he control himself?" S. M. Kennedy.

John Hallock, Director of Personnel at the University of Pittsburgh once said:—"I've noticed 2 things about men who get big salaries: they are almost invariably men who, in conversation or in conference are adaptable, and they quickly get the other fellow's point of view. They are more eager to do this than to express their own ideas. Also, they state their own point of view convincingly." And that takes confidence, both to express yourself, and to see the other fellow's side of things. Remember, the instinctive reactions of flight, fighting back or fainting are not adequate for modern situations. It's the simple brainless thing to fight back. See both sides and weigh the facts before judging.

So we say that the quality of leadership in handling men must be founded upon adequate self confidence. And that lack of confidence or fear is due either to lack of proper training or lack of sufficient successful experience to create confidence. What can we do about it?

Should we try to cure it by driving fear out? Can we cure it? Should we bottle it up and compensate for the lack of confidence by bluster? Mussolini and Hitler look fierce, make faces, work themselves up into frenzied tantrums so that all the world will say: "Who dares oppose their might?" Small boys whistling in the dark.

Professor William James has the answer:—"Action seems to follow feeling, but really action and feeling go to-



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gether; and by regulating action, which is under the more direct control of the will, we can indirectly regulate the feeling, which is not. Thus the sovereign voluntary path to cheerfulness, if our spontaneous cheerfulness be lost, is to sit up cheerfully and to speak and act as tho we're already there. If such conduct does not make you feel cheerful, nothing else on that occasion can. So, to feel brave, act as if you are brave, use all of your will to that end, and courage very likely will replace fear." Soldiers are taught to stand erectly and put on a bold front, partly because the action thru habit tends to build up courage.

The problem is not to cure fear, but to keep it within bounds, and the method is to calm the run-a-way sympathetic nervous system in a roundabout manner. What may seem at the moment to be an emergency to your emotions is probably not a matter of life and death after all. By using a little will power you can calm down the inner turmoil. Take a few slow deep regular breaths. The nervous system finds that is a normal condition and will relax a bit.

Nothing succeeds like success. Generally, people who are lacking in self confidence will find it results from feeling they are not proficient in anything. Not that the industrial "noncoms" of today lack proficiency, but the new materials, new standards of inspection, new engineering methods, lack of trained help, and a thousand other problems so complicate their normal job that it is 10 times as difficult as before and constantly is putting more and more pressure on them, making them less and less sure of their ability to meet emergencies. And the rub comes in at the wrong point—human relations.

Few of us have ever been sufficiently proficient at that anyway, and the great

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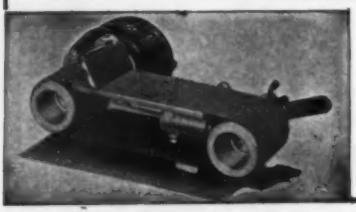

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pressures of today have only aggravated an old weakspot. The immediate need is to develop self confidence quickly . . . self confidence which will aid fast and accurate thinking, support tactful handling of people, make the superintendent **think** as a leader instead of simply blustering and **hoping** he is acting as a leader.

One of the best fields in which to develop self confidence is in speaking before groups. Nothing seems to develop assurance and poise quite so well and so rapidly as putting over your ideas effectively to an audience. The audience seems to require more courage than almost any other situation we face. Short of life and death emergencies, it requires a faster and a more fundamental understanding of human nature, and it demands faster thinking, greater tact, and the ability to organize your ideas for greatest acceptance. Ideas have no propelling power until they are expressed. And expressing them effectively before a small group of fellow-foremen, workers, friends, anywhere, whenever occasion offers, will make their expression in meeting any situation just that much more effective.

One of the most significant movements in adult education in recent times has been the great demand for training in effective speaking. All over the country, thousands of people are meeting in clubs or in classes to practice speaking before groups and to study human relations.

These men have found that the basic problem is fear, lack of confidence, lack of poise; that the next problem is the ability to think on one's feet. Then comes development of a pleasing personality and acquiring of the "YOU" attitude. They have found that the best means of overcoming fear and self-consciousness is the study and practice of speaking before groups, a practice not for the purpose of becoming orators,

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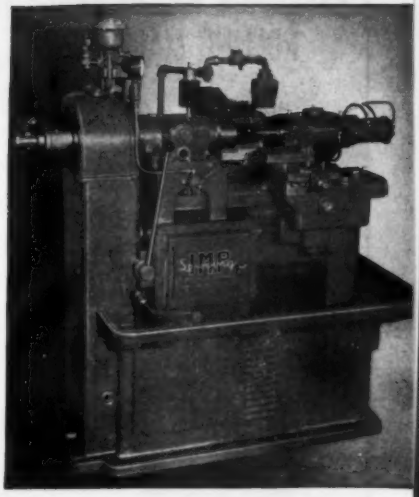


The IMP is intended primarily to handle work demanding high speeds (up to 5000 R.P.M.) and extreme accuracy, but its sturdy, compact design makes it likewise suitable for turning heavier work such as small pistons, bushings, gear blanks, etc. It incorporates such modern features as: Seneca Falls built-in Change-Over Mechanism; positive operation of Third Slide and Back Attachment by self-contained drum cam; anti-friction bearings, and automatic lubrication to all bearings including carriage ways.

An extremely long bearing on the carriage is obtained through the unique head and tailstock design which permits the carriage slide to pass under them. The carriage is mounted on a Flat and a V-way. Longitudinal movements are obtained by a drum cam. Feeds from .001" to .054" per revolution are obtained through 4 feed ranges and by means of pick-off gears—fine feeds being desirable for diamond turning. Two types of heads are available depending upon spindle speed required. A geared head is used for lower speeds and direct drive for higher ranges.

The Lo-swing Imp, because of its integral unit design, lends itself to practically unlimited tooling possibilities. A Third Slide or Over-arm for additional facing, grooving or chamfering operations — either roughing or finishing—can be furnished. Automatic work handling devices are frequently used with this machine.

SENECA FALLS *Automatic* WORK DRIVER

Self Centering . . . Quick Acting . . . No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces—straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO. SENECA FALLS, N. Y.

EXCELSIOR No. 14 ANGLE ROLLING MACHINE

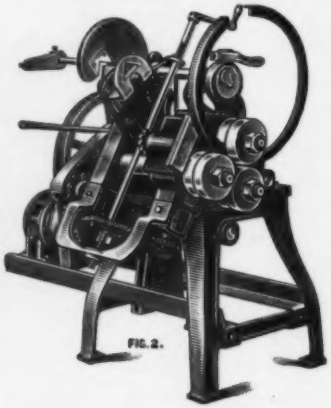


FIG. 2.

Capacity 2x2x¼" Angles. All the rolls are direct driven avoiding slipping of the material between rolls, which are operated by the oversize Excelsior friction clutch. Write for Price and Testimonials.

We specialize in Automatic Grinding and Polishing Machines, to polish Stainless Steel Sheets, Automobile Bumpers, and parts, Stove and Range Top Castings, Electric Iron Sole Plates, etc.

Also Inside Cutting Shears, Deep Throat Power Punches for duplicate work by the use of horse shoe templets up to No. 12 gauge. Used in Stove, Range, Air Conditioning and Kitchen Equipment Plants.

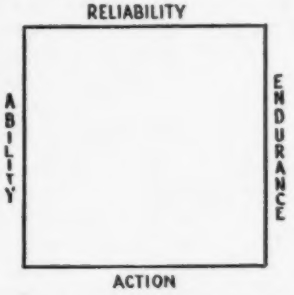
EXCELSIOR TOOL & MACHINE CO.

East St. Louis, Illinois

but to build better human beings.

A foreman has been defined as a man with the temperament and skills of a slave driver, cost accountant, policeman, efficiency expert, labor lawyer, small loan shark, engineer, mechanic, time study expert, practicing psychologist, house mother, father confessor, and wet nurse. Today he is faced with a multiplicity of new problems plus an increasing demand for greater, better, and faster production. More than ever before he must be a leader of men.

And effective leadership means effective speaking, because the only way in which we can communicate our ideas to others is thru the spoken word. Scientists tell us that 88% of all our speaking is done to make friends, ask favors, give or obtain information, to sell ourselves, to put across an idea, to get someone to **act.** In other words, to **persuade people.**



"Men, like bullets, go farthest when they are smoothest." Tact and leadership mean effective speaking or persuasion. Let's take a look at Joe Foreman as a persuader.

Years ago we used to speak of a man as having 4 sides to his personality—mental, moral, physical, and spiritual. Today we put it in slightly different words and say that he has mental ABILITY; that he can think, analyze, plan, remember. He has RELIABILITY and will not fly off the handle;

Here's why shops *busy on the armament program* insist *on Delta Grinders*

1. Special motors designed and balanced exclusively for Delta grinders.
2. Grinder wheels dynamically balanced to 1/100 inch-ounce.
3. Double sealed-for-life ball-bearings—lubricated for life—sealed against grit.
4. Twin-lite Safety Shield—eliminates need for goggles—provides illumination on both sides and face of wheels.
5. Fully machined, easily adjustable tool rest—rigidly mounted adequate guards.

Also Bench Models

Built in both single phase and three phase models, bench and pedestal types, there is a Delta grinder to fit every shop. The motor-driven bench grinder also incorporates all of the latest Delta design and construction features . . . absolute freedom from vibration (due to especially balanced Aluminous Oxide wheels).

Other Delta Low-Cost Machines

A complete line of single and multiple spindle 14" and 17" drill presses.

Metal Cutting Band Saw cuts almost anything in metals and plastics.

Cut-Off Machine cuts speedily and to exact lengths a wide variety of materials.

Send for Catalog

Send coupon below for Delta Catalog giving full details and specifications on the complete line of Delta Grinders.

DELTA
MILWAUKEE

The Delta Manufacturing Company
604-H E. Vienna Ave., Milwaukee, Wis.

Please send me your special Grinder Bulletin giving full details and specifications on the complete line of Delta Grinders. Also send me your latest Delta catalog of industrial power tools.

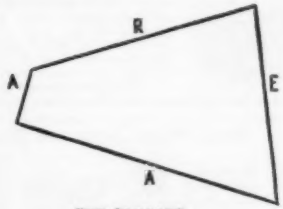
Name.....

Address.....

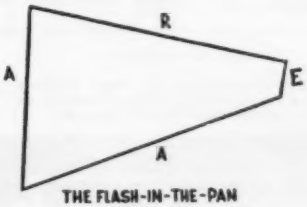
is honest both with others and with himself. He has ENDURANCE when the going gets tough. And he goes into ACTION, readily, consistently, energetically.

These four—ability, reliability, endurance, and action, combine to form the AREA of a man. If we wanted to (if we could find one) we could make a little chart of the ideal man, and represent him with a square, having equal and sufficient amounts of each of the 4 traits. However, few people are well balanced.

In the diagrams I have attempted to reveal common personalities. One of these shows the typical plugger. There's plenty of reliability, lots of endurance, action all the time with plenty of effort, but this type is a little short on ability, probably due to lack of proper and sufficient training.



THE PLUGGER



THE FLASH-IN-THE-PAN

Another diagram shows the well-known flash-in-the-pan — full of "bright ideas," lots of good intentions, much noise, action and bustling around, but a prompt fold up when the going gets tough. This type needs courage,

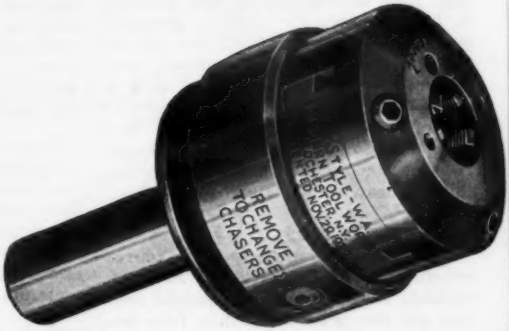
Accurate, Speedy and Economical thread cutting with MODERN ROTARY TYPE SELF-OPENING DIE HEADS

Least number of parts

Simplest construction.

Hardened and ground throughout.

Cuts close to shoulder threads without special chasers.



"WA" Die Head—Ring type for opening and closing.

"WB" Die Head—Trigger trip type.

Easily adjusted for thread size.

Requires no springs to operate movement of chasers.

Made in four sizes having capacity for cutting:
straight threads from ⅛" to 1¼"
straight or taper pipe threads from ⅛" to ¾"

MODERN TOOL WORKS

Division of Consolidated Machine Tool Corporation
ROCHESTER, NEW YORK

and a back bone stiffener of confidence plus more general knowledge.

The aim of a well-rounded program of foreman training should be to develop rounded and balanced personalities—**to build men.** It can be done thru training in effective speaking plus study of the elements of good foremanship plus understanding and practice in handling people. Such a program gets results because first, the job of the speaker before the audience and the foremen's task in dealing with a single worker are similar responsibilities involving the same problems. The foreman sometimes lacks confidence. He sometimes fails to think of the right thing to say at the right time. And, in both cases, there is a **best method** he needs to master.

The typical foreman-training course which consists of a series of 16 or 20 booklets which the foreman should read and put into practice weekly, fails because so many read the first few lessons and then gradually they collect dust. When a similar series of booklets is put into the hands of the men, plus a conference leader's outline for some designated company official to use, the conference leader usually has to do all the talking for the first few meetings, and then finally comes a day when he says: "Let's postpone it until next week." And later—"Let's postpone it a month." And finally "To heck with it. These guys don't enter into the spirit of it anyway."

Training in effective speaking, as such, does a pretty good job but it too has a serious weakness . . . the men have nothing much to say. It is only when there is the 3-fold combination of human relations, effective speaking, and and good foremanship that the optimum results are obtained.

Such training, properly put over, means that the men will first of all be effective speakers, having all the confidence they will need to meet any situation; having a real understanding of human nature and knowing how to use it and appeal to it to get results; having the ability to think on their feet and organize their ideas. It would mean not only that their relations with workers would be lubricated; they would also have a greater understanding of their own problems of production, safety, waste reduction, quality control and the rest. Such a program, moreover, means not just saying "A foreman should have TACT!" "Human relations are wonderful." Not only WHAT to do but HOW, WHEN, WHERE, WHY to do it. Especially HOW. That way we can eliminate fear.

We must keep in mind that in training workers or foremen we are training **men;** we are **producing** MEN . . . not goods. The goods, the results, and everything else will be all right if the men are properly trained.

Millions of Strokes

FOR VICTORY

In speeding up machines for maximum production, *remember* the vital need for accurate production count as given by PRODUCTIMETERS...dependable ...economical...ruggedly built to withstand hard usage and long service.

Stroke Counters described in Catalog 7
Send for your copy today!

DURANT MANUFACTURING CO.
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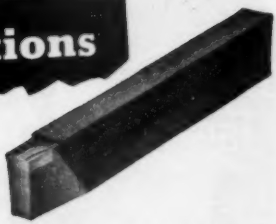
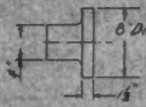
On these 3 Operations



1. INTERRUPTED CUT ON BOILER PLATE RINGS FOR GUN MOUNTS

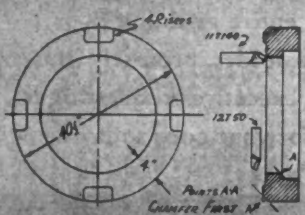
Material: Flame Cut Boiler Plate
Speed: 14 RPM; 190 ft./min.
Roughing: Feed 1/32"—Depth 3/16"
Finishing: Same Speed and Feed

2. ROUGHING AND FINISHING 8" DIAMETER GEAR BLANKS



Material: Rough Forgings SAE 1045
Speed: 165 RPM; 340 ft./min.
Turning O. D.: Feed .010"—Depth 1/8"
Facing: Feed .003"—Depth 1/8"

3. FACING AND BORING ALUMINUM RING CASTING



Material: Aluminum Bronze Casting
Speed: 19 RPM; 200 ft./min.
Facing: Depth 3/16"
Boring: Feed .011"—Depth 3/8"

KENNAMETAL* Performed *Successfully*

AFTER ORDINARY CARBIDE TOOLS HAD FAILED

KENNAMETAL tools were used as standard on each of the jobs illustrated at left, after other carbide tools tested had failed to perform efficiently. All three operations were accomplished easily with KENNAMETAL, at the economical speeds and feeds mentioned.

Because of similar superior performances on many types of jobs, KENNAMETAL is decreasing machining time and saving money for manufacturers throughout the country. The KENNAMETAL representative in your district will gladly survey your tool requirements and demonstrate how KENNAMETAL can save you time and money. Write us.

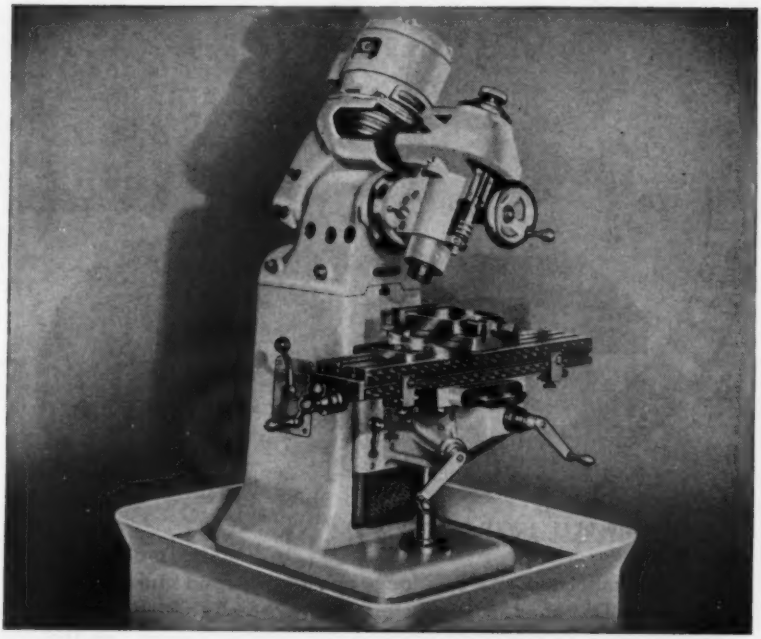
*** Invented and Manufactured in U.S.A.**

It's a whole grinding shop in itself!

Here is a single, flexible, precision grinding machine so versatile that it will handle external, internal, surface, tool spur gear and other classes of grinding. Shifts from job to job easily and quickly. A real convenience and money saver for maintenance shops and tool rooms. Conserve time, floorspace and money on small lot work with a single machine that performs every operation required of an entire grinding department in many plants. Large new folder, profusely illustrated, gives all details. Free to executives requesting it on business letterhead. Write for your copy today.

FITCHBURG GRINDING MACHINE CORP.
2004 FALULAH ROAD
FITCHBURG, MASSACHUSETTS, U.S.A.

ELGIN



Precision

VERTICAL MILLING MACHINES

ELGIN TOOL WORKS

1772 BERTEAU AT RAVENSWOOD AVE. — CHICAGO, ILL.

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COVEL UNIVERSAL ANGLE PRECISION VISE

Here's a precision vise that locks into any desired combination of angles. Designed for small work, it is especially suited to holding tungsten carbide tools for reconditioning—it stays "on the mark at any angle"! Detailed description of the complete line of Covel Precision Vises is contained in Covel Bulletin MT 82-741. Write for your copy *today!*

Grinding Machinery Since 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICH.

A Battery of Power Saws cutting X1335 shell billets to 15" lengths.

Billets to Bullets in 4-Acts

AS INDUSTRY goes all-out to lick Axis, the enemy quakes in the knowledge that we're not kiddin'. Many of our former defense operations now are openly recognized as necessities in a hurry-up struggle to win the war.

Americans are fighting mad. Already the gigantic power of America's production system is being felt on many battle fronts. This combination of fight-ing-mad Americans and the high capacity of our well-oiled production system will win the war. But, this is no small task! In the first act of "Billets to Bullets" are observed several gondola cars and a snorting locomotive moving along the spur track entrance of a huge plant, where formerly the entire production effort was concentrated on the building of agricultural equipment. Here in this large, modern, metal working plant (and in many others) it is literally true, men are beating plowshares into shells.

As the giant locomotive speeds away with a load of the finished product, a 40-ton crane with an electric magnet sets to work to relieve the creaking

Closeup of one of the saws and a billet end.

gondolas of their overloads. With every lift of the magnet, the springs under the cars slowly push their way back to normal length. The stock being unloaded from the gondolas is 20 feet long, 5½x5½" square, and mill marked X1335.

Act II—Billets Piled High at the Saws

As the curtain rises on Act II, a battery of power saws is chewing the steel with ease, rhythm, and speed comparable to that of a skilled woodworker as he saws his way thru a heavy board.

Also, with a precision that is almost uncanny, the hydraulically controlled power saws perform and repeat their cycles with little attention. But, unlike human hands, the saws never tire —never stop—never rest.

When the saws are equipped with hydraulically operated conveyors, the cycle continues from noon until night with only the aid of the re-load man. As the operation progresses, the cycle may be divided into 6 distinct parts:

1—The blade is lowered to, and fed into the work under the correct hydraulic feed pressure . . .
2—At conclusion of the cut the blade rises clear of the cut, double quick to permit . . .
3—Opening of the stock locking vise, and . . .
4—A pull forward on the remaining piece of stock . . .
5—Length gauging is automatic, too . . .
6—Locking vises are closed hydraulically, and the cycle repeats.

Sawing continues at the speed set on the dial indicator until the last remaining stub of material automatically stops the saw for reloading.

Hand operated conveyors, similar to the automatic conveyors, also may be installed on plain type machines. Where hand operated conveyors are used, it is necessary for the operator to roll the stock forward at the completion of each cut.

The required length of the pieces for forging 155 mm shells is 15". It is very important that the billets be cut accurately to length and absolutely square to avoid trouble at the forge. When the cherry-red billets are removed from the furnaces, they must rest squarely on end, ready for drawing and piercing. Besides the importance of square, accurate cuts it is essential that the face of the cut be protected against the damaging effects of high cutting temperatures and fractures.

High cutting heat may alter the analysis of the stock. And, any cutting method that causes fracturing may be responsible for costly damage to equipment and even sacrifice lives of gun crews in battle. Sawing cannot surface harden or fracture the precious metal. The cool-cutting blade removes

FOR THE DURATION!
• MORE SPEED
• LOWER COSTS

FAMCO Presses step up production and assembly operations requiring percussion and pressure. 40 STOCK SIZES AND MODELS scientifically engineered for greater capacity, size for size, and trouble-free operation.

Write for details.

FAMCO MACHINE CO.
1320 18th St., Racine, Wis.

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Speed and Precision
FOR SMALL TOOL JOBS

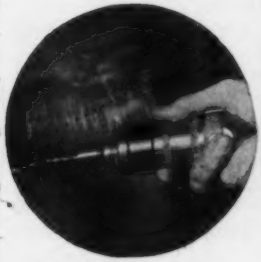
ARO PNEUMATIC TOOLS

● More and more industrial plants today are gearing up operations to *top speed* with precision by using ARO Rotary Pneumatic Tools! Unbeatable for small tool applications such as drilling, screw driving, nut setting, grinding, filing, polishing and similar operations. Saves both time and money over hand methods or the use of larger tools. Light in weight—yet speedy, powerful, practical! *We invite comparison.*

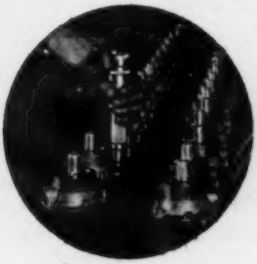
Send for complete catalog showing applications that may help speed up your production. See your ARO Jobber or write

THE ARO EQUIPMENT CORPORATION, Bryan, Ohio, U. S. A.

Pneumatic Tools—Industrial Lubricating Equipment—Aircraft Products



✓ AIRCRAFT DRILLING



✓ SCREW DRIVING

✓ FILING

as little as 1/16" of fine steel chips which are instantly washed away by the coolant. The small amount of metal removed means less cutting time in the shell plant, less haul-back tonnage for the railroads, and less re-roll time for the steel mills.

Act III—Billets at the Forge

Billets move fast at the forge. As a red-hot billet is lifted out, another squarely cut piece, 15 x 5½ x 5½" is dropped into the gas and oil fired, rotary furnace to start its cycle in heat treatment. The treated billet is dropped into a conveyor, passed thru a scaling operation and dropped nose downward into a thousand-ton hydraulic piercing punch press. In 2½ seconds the billet is drawn to a length of 29½x6¼" in diameter. A 300-ton hydraulic ram ejects the shell forging which is set aside, cooled, and later conveyed to the machine shop where it is turned to size.

Here's the set-up for cutting butt-ends of shells.

Act IV—Sawing off the Butt End

After the shell forgings have been turned down to correct dimensions in the machine shop, they are placed in double line formation on the conveyor line and sent thru the saw for the final butt-end cut.

A 14" Peerless Saw cuts the 2" butt-end after the forgings leave the machine shop.

DOUGLAS

PLAIN MILLER

FOR SMALL PARTS PRODUCTION

WIDE RANGE OF SPINDLE SPEEDS from 75 to 1200 R.P.M.

TABLE SIZE 32 x 8

QUICK DELIVERY BY LARGE SCALE PRODUCTION

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ACROMARK means "ACCURATE MARKING"

and the ACROMARKER is only one of the FAST but simple machines our skilled workmen build for marking.

This machine is provided in several sizes and special fixtures are made for special work.

Send us your marking problem—Priority deliveries are FAST.

WRITE FOR CATALOG No. 52.

THE ACROMARK CORPORATION
15 MORRELL ST., ELIZABETH, N. J.

A 14" Peerless High Duty Saw is used for this purpose. The air-operated holding vise securely locks the shells in place while the 2" butt-ends are removed. A 4-point, .072x1.5", high speed blade is used. Between 2000 and 3000 square inches are cut with a single blade when the best coolants are used. The saw is operated at high speed—125 strokes per minute. Low and intermediate speeds, 50 and 85 strokes per minute, can be engaged instantly as conditions require.

After the butt-end cut has been made, the shells are weighed as a final check on their uniformity before they are released for filling.

Every operation from "Billets to Bullets" is handled with the utmost speed, to back up the men in the front lines of our fighting forces. The type of shell described here is projected from a husky, short-barreled gun, commonly called a mortar.

The fact that a single gun can project shells faster than a full factory shift can produce them is a challenge to American industry, as well as the back-home worker who is determined to keep 'em shootin'.

BURKE
MILLING MACHINES
Make Fast Work of Small Jobs

Motor Driven

Timken roller or ball bearings to spindle

Write today for circulars.

Burke Machine Tool Co.
297 E. 16th St., Conneaut, Ohio

Ryerson Issues Machinery Catalog

A handy illustrated, pocket-size machinery and tool catalog (No. 42) for the metal working industry has recently been issued by Joseph T. Ryerson & Son, Inc., Chicago.

Containing 96 pages, it lists cutting, bending, grinding and punching machines for plate fabricating structural and general maintenance work, sheet metal and machine shops.

Latest type metal working tools and machinery, power or manually driven comprises a wide selection from which to choose.

Specifications, illustrations, and performance data for all equipment give concise, helpful information.

AVAILABLE FOR WAR PLANTS

New facilities and expansion of output makes reasonable deliveries possible now to essential war plants on these vital inspection devices.

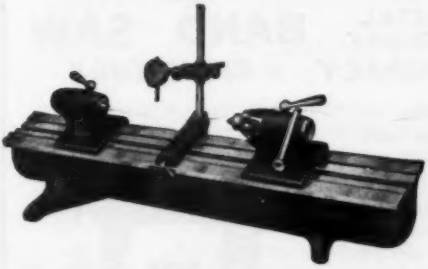
Write or wire for details

THE AMERICAN GAUGE CO.
126 Bayard St. Dayton, Ohio

Designers and Builders of Tools, Dies, Gauges and Checking Devices since 1919

AMERICAN THREAD CHECKER

Recommended and used by leading manufacturers of thread grinding equipment for accurately checking threads on pitch line to one ten-thousandths. Capacity up to 5 in. diameters.



AMERICAN BENCH CENTER

Improved design. Three sizes; 4"x10"; 6"x24" and 8"x36". Inclined bed to better facilitate removal of work. Box type construction, precision scraped. Ruggedly built for either inspection or production work.

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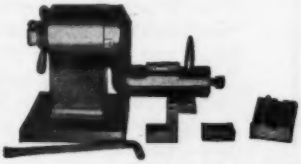


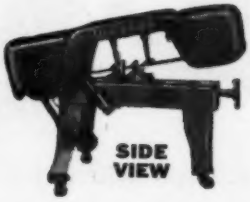
Dresses surface grinding wheels to either convex or concave radii to quarter-tenth accuracy. Will improve the radii on your gauges, grinding formers, form tools, punches, and dies.

METAL SAWING- *Streamlined*

JOHNSON METAL CUT-OFF BAND SAW

✓ SPEED ✓ ACCURACY ✓ EFFICIENCY

Plant production men working on "impossible" completion schedules know and appreciate the Johnson Saw. Set-ups require only a minute or two, cutting action is fast and continuous. Unlimited adaptability and flexibility for handling almost all kinds of cutting. 3-point base makes special flooring unnecessary.



JOHNSON MANUFACTURING CORP.
ALBION MICHIGAN

Write today for descriptive folder to:

Sales office: 5000-04 CHRYSLER BLDG., NEW YORK

Important to users of

HIGH SPEED STEEL

Jessop TCM

Jessop TCM is a new high speed steel that will help you meet today's stringent demands for more production . . . for it has the correct balance of elements to provide maximum machine producing time. Jessop TCM performs as well or better than 18-4-1, with lower initial cost.

The lower temperatures required for heat treatment result in lessening production cost. Also, it is heat-treated in the same equipment and the same atmosphere at 18-4-1.

Jessop TCM conserves vital alloys, and gives more for your money than other high speed steels.

Write today for descriptive literature.

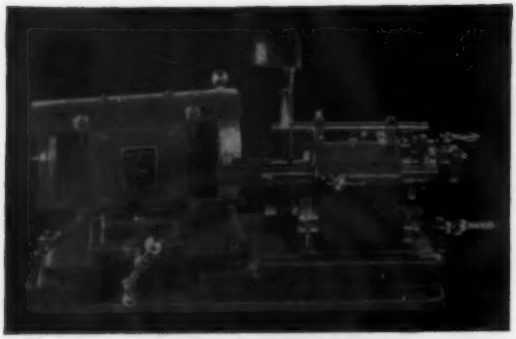
JESSOP STEEL COMPANY
WASHINGTON, PENNA.

JESSOP STEEL CO. WASHINGTON, PA. FINE JESSOP STEELS

JESSOP STEELS FOR AMERICA AND HER ALLIES

CARBON · HIGH SPEED · SPECIAL ALLOY · STAINLESS · COMPOSITE STEELS

One Man Got 40,000 Holes per Tap Instead of 8,000 — and so can you —



by using a

J-B TAP GRINDER

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Shaped Diamond Tools

By PAUL GRODZINSKI, Consulting Engineer

DIAMOND tools, for the working of metals by turning and boring became generally known only after the last war, in spite of some applications made public at earlier dates. It can be said safely that the acceptance of diamonds as real production tools has taken place during the past 20 years. Progress in the production of interchangeable engine parts for use in automobiles and aircraft is more or less due to the superior accuracy and surface quality obtained by the proper use of shaped diamond tools. Progress in several directions was necessary to introduce diamond tools into production. These were:

(a) Evolution of suitable cutting edges.
(b) Setting or mounting of the tool edges in holders.
(c) Adjusting the cutting edges towards the workpieces.
(d) Development of suitable machine tools for high speed operation, with small feeds and cutting depths.

In all these directions, the diamond tool imposes special demands. In fact, one can safely say highest demands; but it was fortunate that simultaneously with the recognition of the diamond, sintered carbide tools and light metals were introduced in machine shop materials which lead to similar production problems.

It is well known that every different tool material, such as tool steel, high speed steel, sintered carbides, etc., and any material to be cut, introduces the factors of special tool angles for the safe reduction of chips, exacting requirements with regard to a smooth surface, the matter of durability of the cutting edge and the question of power consumption. In the case of diamond tools it is frequently stated in error* that for this purpose, small splinters, chips or fragments of diamonds are used. This is far from the facts, since it is necessary that diamonds present

*Manual on Cutting of Metals, p. 25, The American Society of Mechanical Engineers, 1939, New York.

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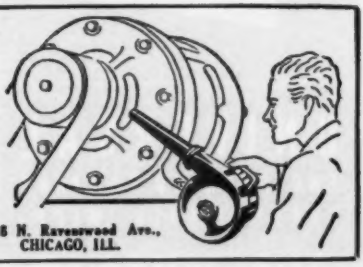

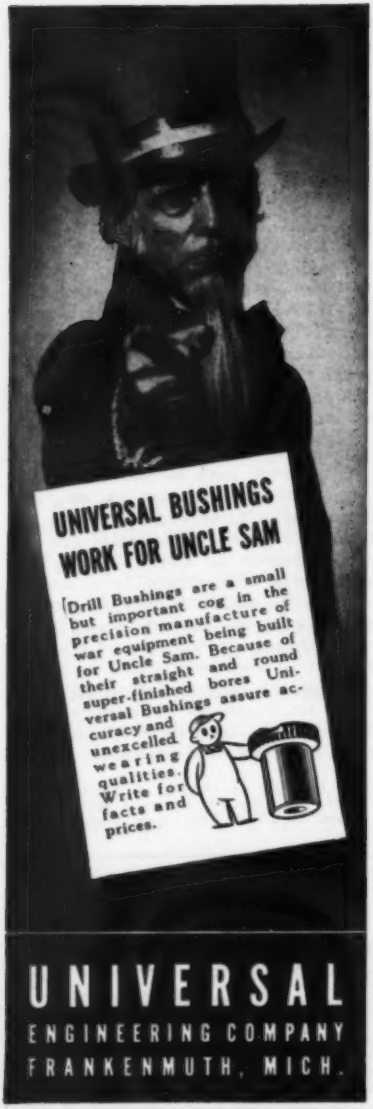
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real and substantial cutting edges with definite angles towards the work. As much depends on the strength of this edge, it cannot be just ground out of a diamond splinter of nearly the approximate shape.

A durable cutting edge will only be obtained if the diamond is cut and polished according to its crystal structure. From a finished diamond, it is not readily apparent if just a suitable piece has been used, or if the diamond has ben cut according to its structure (Fig. 2). In the former case, the tool can be offered at a considerably lower price, as a minimum of polishing work is involved, whereas a correctly shaped tool involves a considerable loss in diamond substance (sometimes 40 to 50% or even more) and high cutting costs. As a rough estimate, it can be said that the costs for cutting away a distinct volume of diamond are as high as the loss in raw material. In literature, it is mentioned that for industrial purposes black diamonds, i.e., carbons (the cryptocrystalline formation of diamond crystals) are used, but this has never occured in my experience. Black diamonds are quite useful tools for truing grinding wheels, as well as for rock and stone cutting.

What is the difference between the diamond and other materials in cutting operations? In the cutting process, a tool edge in the shape of a more or less obtuse wedge breaks out chip elements from the material to be cut. In the case of brittle materials, they have the form of single chips, whereas on tougher materials the generated heat welds the particles together, resulting in a more or less uninterrupted or flowing chip. Recent investigations have shown that the main stress and the main wear of the cutting edge caused by the chip occurs not directly at the point but somewhat distant from it.

In such a case the surface obtained is relatively rough, as the wedging ac-

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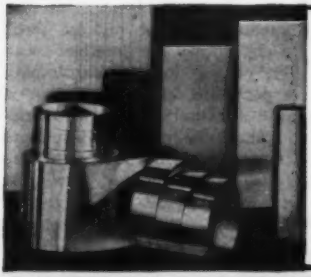

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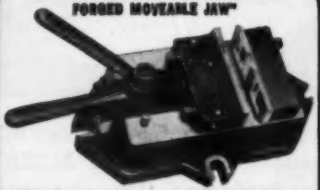

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tion causes a breaking-up action far ahead of the cutting edge, going deep in the uncut material. However, by increasing the cutting speed, and reducing the cutting depth, the point of the chip contact and maximum chip pressure approaches more nearly to the cutting edge, and thereby the formation of the so-called built-up edge (an accumulation of chip debris on the cutting edge) is prevented. In the case of a steel tool stressed directly on the cutting edge, for instance, when taking a very fine chip, it would become blunted very quickly. Consequently the produced surface becomes inaccurate and rough. From this it follows that a cutting process with high speed and small chip cross-section (small feed by small cutting depth) will prove economical only in case a tool edge of great wear resistance is applied.

Further, the tool material must be so hard and of such a great compressive strength that its position towards the workpiece is not changed either in the loaded or the unloaded condition. In this respect, the modern sintered carbides are already superior to the best high speed steel tools, as a softening of the cutting edge occurs at a very much higher temperature and, therefore, speed.

However, optimum results have hitherto been achieved only in the case of certain materials by using diamond tips, as the diamond, known as the hardest substance, is of highest wear resistance and shows the smallest compressibility of all known substances. In this respect, the differences between the metallic substances used as workpiece and the non-metallic properties of the diamond may be of special importance, as no momentary welding action between tool tip and removed chips can take place.

As a matter of fact, with a single-pointed diamond tool, very precise surfaces of great smoothness can be gen-

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erated, and the dimensions of the workpiece can be sustained over a longer time and series of workpieces. Any wear which reduces the useful life of other tools between grindings, requires interruption of operations for regrinding or for readjusting, whereas a new tool is necessary in the case of a diamond only after very extended use. A point of particular importance is that only one tool edge is in operation, so that the action of the tool is not impeded by that of other tool edges. The single tool point moving relatively to the workpiece with high speed, cuts a surface which corresponds to the geometrical idea as nearly as possible. To achieve this, rotating workpieces, as in lathes, as well as rotating boring bars, have to be properly balanced.

One main factor in these fine-boring and fine-turning operations is the cutting speed. Recent investigations have shown clearly that there exists a critical speed above which very smooth surfaces are generated. This speed for the cutting of steel by carbide tool is about 300 fpm. This is in conformity with the usual recommendations for diamond tools, viz., that the speed shall not be less than 300 and preferably 600 fpm, while only in emergencies should speeds as low as 200 fpm be used.

It may be mentioned however, that Continental researches with diamond tools have shown that the diamond produces quite smooth faces below these speeds. This is an interesting fact showing the absence of any affinity of the tool material towards the workpiece, but in such cases the production time is extended, and the wear of the tool edge might increase well above usual standards. With high cutting speeds in combination with small feeds, as recommended for these processes, the effective cutting time becomes

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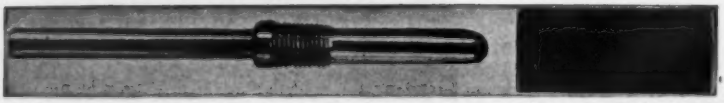

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small with respect to usual boring and turning operations, and it is usual practice to increase the cutting speed up to the limits imposed by vibration of the machine, or heating of the bearings.

Owing to the small cutting pressure present at high speeds, no great load is imposed on the diamond tip. In spite of this, the tool tip must have a rigid mounting and should not be subjected to any bending stresses which might cause vibration and interfere with the production of a smooth surface. Extreme conditions in this respect are present in the case of profile tools, for instance, cutting-off tools and grooving tools of very slight width which further require that the tool holder does not project. Usual methods for very small tools, for instance boring tools in small cylindrical shanks, are the brazing-in and cold-setting for larger tools.

Some methods make use of diamonds machined all over, and good results are reported, in spite of the somewhat elaborate method of production. The ideal support for the diamond in a holder is the ball, as thereby, stresses imposed on the diamond become relieved; methods are known in which a half of a hardened steel ball or hard-metal ball is cemented to the lower side of a flat ground diamond, or the diamond is provided with a lower hemisphere. With these tools, larger chips can be taken than with diamonds fixed according to conventional methods.

Correct adjustment of the cutting edges is a special problem encountered in both cases—turning and boring operations. In the case of lathe tools for external turning, it is necessary to distinguish between height and sidewise adjustment. Diamond tools have usually no rake angle. The top surface of the tool tip has to be adjusted

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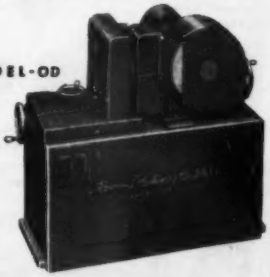

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horizontally and there is no true rake angle when the tool is on center height. To obtain small positive rake angles, the tool is usually adjusted slightly over center height. The extent of this adjustment, is however, limited by the reduction of the clearance angle. This is sometimes considered as an advantage owing to a kind of burnishing action against the finished work face.

As on big workpieces the exact center height is somewhat difficult to find, the use of special devices is recommended for this purpose. If the tool edge cannot be adjusted on center height, for instance in the case of turning big commutators in their own bearings and in multi-tool operations (if several tools have to machine successively the same groove of a piston), a radial adjustment of the tool edges and tool holders with respect to the workpiece has to be used, eliminating danger of adjustments below and over center.

The smooth surface is obtained mainly by a kind of burnishing action caused by a small adjusting angle (between 6 to 2°) between tool edge and machined surface of workpiece. As this angle is difficult to observe and measure when adjusting the cutting edge, optical means such as lenses or tool makers' microscopes are frequently used. This is necessary in particular to avoid damaging the sensitive tool edge when brought into contact with the workpiece. A visor containing the 15- to 20-fold magnification of the cutting edge has proved to be of special advantage for the correct adjustment and protection of diamond cutting edges.

In the case of boring tools a special problem arises, since adjustment for the cutting depth and the actual diameter must be contained inside the boring tools, an operation otherwise carried out by the upper slide of the lathe. Usually the tool shanks are

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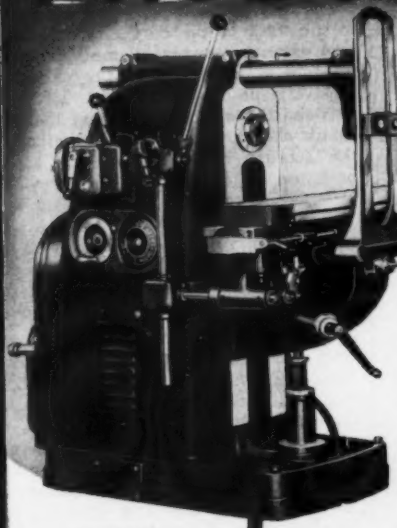

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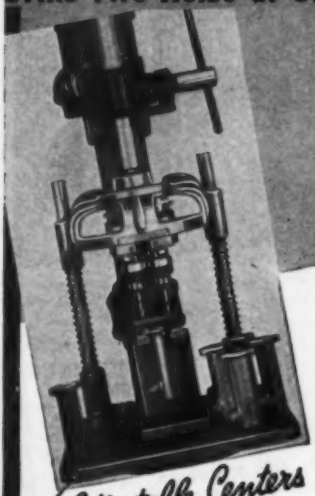

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detachable in the boring bars. These are placed in special lathes, either between centers, or clamped in the tool slides, or fixed in the spindle cones of especially fine boring machines. The tool shanks, preferably of cylindrical shape, have to be clamped and finely adjusted.

The usual clamping screws vertical to the axes of the bars do not represent safe and correct clamping means, in spite of the fact that they are extensively used. At least a soft pad between the end of screw and the tool shank should be provided, eliminating the scoring of the shank by screw pressure. A better means is provided by splitting the bar and using binding screws, or using so-called pad-bolts of varying design in solid boring bars. In such cases, good fitting tool shanks are not brought out of center and the clamping pressure is distributed over a wider area.

Of the same importance is the correct design of means for fine adjustment. Besides head screws and differential screws which engage the free ends of the shanks, micrometer adjustable tool shanks met with great success when introduced some years ago. In such cases, the tool shanks are first clamped securely in the boring bars, and afterwards fine adjustment of the tool edge is carried out, supported by the use of a setting gauge with dial indicator. Another successful principle is incorporated in the so-called spreading shanks. In this case, no other clamping means is necessary, and the boring bar is only provided with the hole for the tool shank. Thus a weakening of the boring bar and eventual throwing out of balance are prevented.

After the spreading shank has been fixed in the approximate position, the fine adjustment of the tool edge is carried out by means of temporary propelling and withdrawal tools, according to a setting gauge with dial

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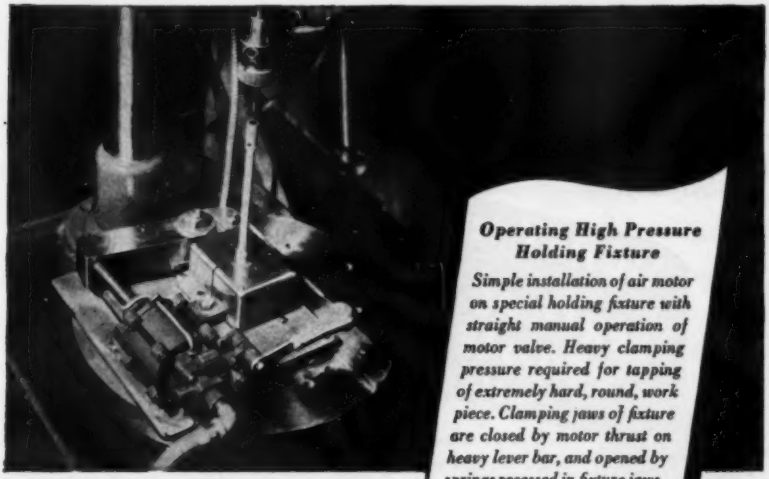

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indicator. The main advantage of the two last designs is that the fine adjustment is carried out after the shanks have been fixed in the bar, thus eliminating possible errors thru clamping. Cylindrical holders are nearly always used, as they have the advantage of changing the cutting angles by turning the tool shank on its axis.

As already explained, diamond tools have special requirements with respect to cutting speed, fine feed and cutting depths. For such purposes, only certain machine tools are suitable, incorporating at least the precision necessary in toolmakers' lathes and precision grinding machines. High speed machines require special bearings, often plain bearings with the least possible clearance. Such spindles tend to bind in the bearings when hot. Therefore, special devices for conducting the heat away, by means of a continuous flow of lubricating oil or a cooling water jacket, are necessary for bigger machine spindles.

The spindles should not be gear driven as gears may introduce chatter marks and vibration. A special characteristic of machines for this work is the absence of any gear in the head stock. Further, the driving spindle should be carefully relieved from any belt stress. There exist two possibilities which are widely used, either arranging the driving pulley in separate bearings, independent from the spindle bearings, or the driving of the main spindle mounted in very accurate bearings from another co-axial spindle by means of a compensating coupling. The second spindle, preferably equipped with ball bearings, is, for instance, driven in the usual way by belt, but no thrust whatever, with the exception of torque, is exerted against the main spindle.

Frequently older machines, lathes or grinding machines, are rebuilt for the purpose of diamond boring and this has proved to be successful in many instances. It is not necessary to rely on exact slides, if the boring bar in the case of fine boring performs, besides the rotating movement, also the reciprocating feed movement, obtained, for instance, by a screw mechanism and reduction gears, or a differential screw arrangement. A finer feed can be obtained by using the usual feed gear boxes and, in addition, a special reduction, and the adjustment of small cutting depths is obtained by special devices incorporated in the tool holder, allowing a fine adjustment and being independent from the condition of the tool spindles.

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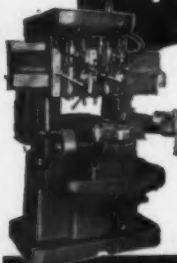

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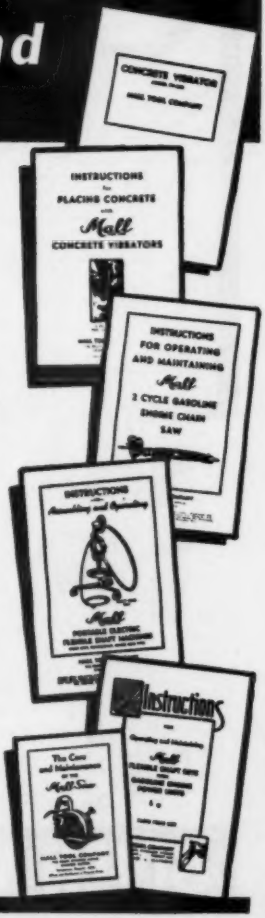

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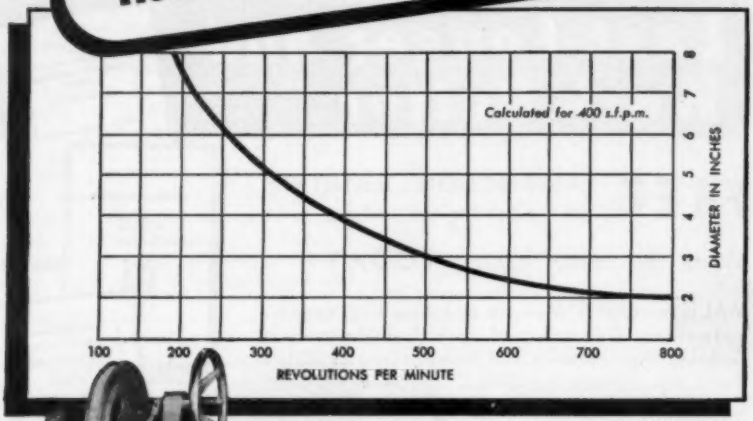
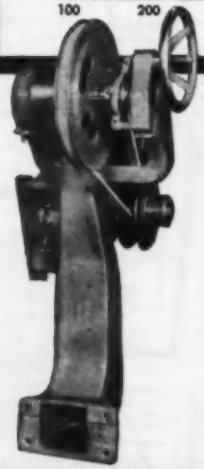
Surface feet per minute



Use chart to determine proper carbide cutting speeds for X1314-X1340 steels



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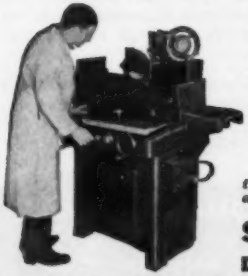

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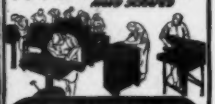

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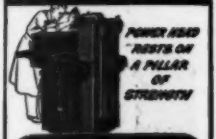

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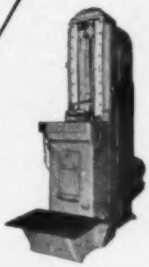

Many producers of war materials have come to "Bank on American" for greater output. In these times of labor shortages it is imperative that maximum production be obtained with semi-skilled or unskilled help. It is significant therefore, when a single American Broaching Machine can often replace a battery of other machines and give equal production results.

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Aspects of Modern Milling

By John E. Hyler

THERE are many reasons that might logically be advanced for the ever-increasing volume of work that finds its way to various types of milling machines, but in the final analysis, any one of these reasons might in some measure or degree be found to bear directly back upon the all-embracing idea of production speed and economy. The milling machine, in its various forms, does represent production economy in an outstanding way, regardless of the fact that milling cutters are known to have a certain theoretical weakness. Other things being equal, your lathe, planer or shaper tool will be cutting a constant thickness of metal all the while it is in the cut. This is not true of a revolving cutter having cutting edges disposed around the periphery, nor is it true of a fly cutter.

The tooth of a milling cutter approaches the cut on an exact tangent with the surface being milled, and therefore it first actually slides on the surafce just milled. Then, it begins to bite into the material almost imperceptibily, and the "bite," beginning at zero, may have considerable thickness when the chip is thrown clear of the work, depending upon interrelationship between feed speed, cutter rpm, and the number of teeth on the cutter being used.

Milling Machine Cutter Development

There are 2 important factors in the improvement and development of modern milling machine cutters. One is the development of new and better forms of cutters, and the other is the discovery and use of better cutting materials for making cutting tools. If you want to start a hot argument in almost any machine shop, simply state that one of these 2 phases of milling cutter development is more important than the other, for you will find radical exponents of both sides of the case everywhere. In my own mind, the battle results in a draw, and I am quite content to let you have your own way about it. As a matter of con-

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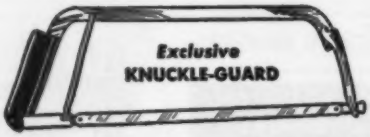
venience, let us first consider the different forms and types of milling cutters as found in use today. It will be assumed that the reader is conversant with the distinction between vertical milling machines and the plain horizontal or universal types, and for that reason no particular reference will be made as touching the applicability of different cutter types to their corresponding machine types, except as cases arise where it seems particularly necessary to do so for some other reason.

Some of the most progressive makers of milling machine cutters recommend the use of inserted-tooth tools when the diameter is 7 or 8 inches or more. The main part of the cutter may then be made of ordinary machinery steel. Surface-milling, side milling and face milling cutters may all be made with inserted teeth, tho the diameter mentioned refers particularly to surface millers. I know of one firm that makes all these types with inserted teeth. You will appreciate, however, that there is an added advantage in the inserted tooth or blade, in that such blades may be the more readily fitted with special cutting materials. One firm makes both standard and special inserted-blade milling cutters either of high speed steel, or of Stellite, or blades tipped with cemented carbide. The usual means of locking inserted teeth in a milling cutter body, is pulling a drilled,



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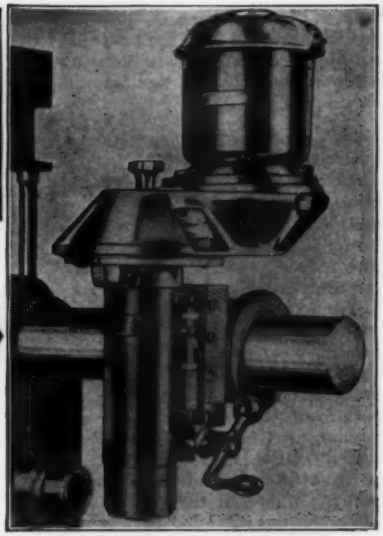

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tapered bushing into a tapered seat adjacent to the face or rake of the cutting blade, so that the bushing is made to bear tightly against the face of the tooh or blade.

The provision for removal of the bushings and the teeth is interesting. A hole is drilled and tapped into the cutter body to receive the threaded ends of the pull-screws that pull the bushings tightly down into their seats. The bushing itself is also threaded internally, but at a diameter enough larger so that it causes no interference with the pull-screw. Then, when it is desired to remove the bushing to take the teeth from the head, the pull-screw is removed, and in its place a screw is substituted which has a threaded portion next to the head which will fit the threading in the bushing. There is an extended smaller-section portion which bottoms in the hole in the cutter body, the extended part being small enough in diameter so that it does not contact the threads in the hole, but bears only against the bottom. As this is turned into the bushing threading, when the end of it bottoms, a thrust is set up which pushes the tapered bushing back out of its seat.

Thread Milling Cutters

The milling of threads as an alternative to cutting them at the lathe, is a subject that has carried a great deal of interest in recent years, and it has been found that on many types of jobs, threads may be milled more rapidly and more accurately than they can be produced at the lathe. Inevitably, both thread milling machines and thread milling tools or cutters have been produced. One of our foremost manufacturers of gear hobs also produces thread milling cutters, as they may be required by the trade. Some manufacturers specializing in milling ma-

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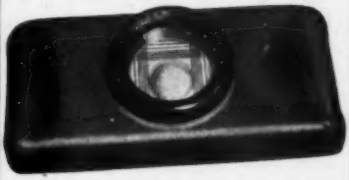

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chine cutters in general, also make threading hobs for the trade.

The cutting of sprocket wheels for roller chain transmission work is a ticklish proposition from the standpoint of requiring careful control over the contour of the cut, for the chain rollers must seat properly in the sprockets, and must contact and leave the teeth in just the correct manner. Standard tooth forms for roller chain sprockets have been adopted by both the SAE and the ASME. Milling machine cutters which will produce chain sprocket cuts according to the specifications of these organizations may be obtained from representative milling cutter manufacturers. At least 2 that I know will furnish such sprocket cutters.

One of the outstanding developments in milling cutter tooth arrangement is the so-called staggered tooth. These cutters are made in such manner that the teeth are staggered as to their lateral position on the cutter body, but in addition to that, the face or rake of each tooth is spiral-angled, adjacent teeth being angled in opposed directions. This method of making a cutter results in very free and easy cutting. You will be surprised, if you have never used this type of cutter, to see how large a bite you can take without stalling the machine or causing trouble. The real first purpose of such cutters is for the taking of deep cuts, but it does not follow that they will not suc-

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Developed originally by Michigan Tool Company to improve quality and lower production cost of automobile gears, the crossed-axis gear finishing process is rapidly becoming universal, regardless of whether such gears are required in job-lots or on a mass production basis: for motor vehicles, for tanks, for machine tools, for aircraft, etc.

Today there are "Michigan" gear shaving and "Michigan" gear lapping machine types available for virtually every size of spur or helical gear needed in the war effort—and in the peace to follow.

We will be glad to send you a copy of "Better Gears" to help you in the selection of methods and machine types needed for your specific war-production requirements.

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cessfully take care of light ones. They may be used for either. They are produced by several good makers of milling cutters. Some of the production records which tools of this kind have established on channeling cuts, as for instance the cutting of long keyways in shafts of chrome nickel steel, are interesting indeed.

Holding Close Widths

There are times when it becomes a matter of great importance for your milling machine operator to be able to hold a width very closely, either of a channel cut being made, or of a portion left standing as in straddle-milling. This is a matter of more ready accomplishment than formerly, if one is properly equipped. Close adjustment for channel widths may be obtained thru the use of so-called "interlocking" side cutters. These are cutters having relatively wide-faced teeth on a thinner cutter body, and so milled and arranged that when a pair of such cutters are nested closely together, the teeth of the one fall into the gullets of the other and vice versa. The result is an overlapping of tooth edges, which allows width-adjustment of the tool to be made. Thus, it is possible to machine a slot to just the size required. Tools of this kind are made by different cutter manufacturers.

As for holding a width closely when straddle-milling (or for that matter in any place where close adjustment between two different milling cutters on the same arbor is required) there is an adjustable micrometer spacing collar available for use on the milling machine arbor, that may literally be adjusted by thousandths, simply by loosening the arbor nut. There are countless places where you will find such an adjustment of very great value. In some places, naturally, they are of greater value than in others, for there are times and places where gangs of

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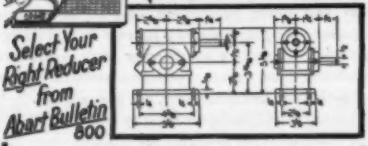

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Rounds	5" dia.
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WELLS METAL CUTTING BAND SAWS

cutters are mounted and spaced upon the same milling machine arbor, for complex, many-surface jobs to be done at a single pass of the work.

Formed Cutters

Formed cutters have already been suggested with reference to the sprocket cutters which were mentioned, but be it remembered that in the field of formed cutters, there are endless varieties and possibilities. You will find that manufacturers of milling cutters who have had experience along this line, are ready and willing to make you a cutter that will machine any form you desire at the milling machine. Even in the case of some job you might not consider possible as a milling job, you are advised not to give up the idea until you have first consulted a milling cutter specialist. What cannot be done in one pass of the work can often be done in two, and further than that, special types of milling machines have been devised for handling some of the jobs that at first did not seem practical. Gear cutters are naturally formed cutters, and must be made with all care, to agree with the involute curves that must be incorporated into the gear teeth being formed. Gears have been cut to a considerable extent, in small lots, on milling machines fitted with dividing heads. These will be considered more fully later on. Suffice it to say here, that makers of milling cutters in general are in some cases makers of gear cutters also.

There are many cases where it is necessary or desirable to make slit-type cuts at the milling machine, in which case a saw type of cutter is employed. When we get into an examination of metal-slitting saws as used at the miller, we find the honors for making good ones are pretty evenly divided between manufacturers of milling machine cutters in general, and a

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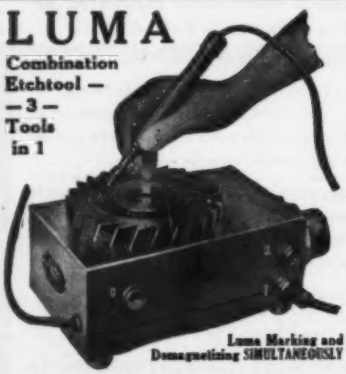

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Stroke ¾"
Capacity soft iron ¾"Dx⅛"
Weight 120 lb.
Power required ¼ to ½ H. P.

Price $125.00

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Alva F. Allen, Clinton, Mo.

class of manufacturers who make saws for various other purposes. I know of at least two representative makers of milling machine cutters, who make them in great array, who also make slitting saws, and I know of at least 2 outstanding saw manufacturers, who make slitting saws for milling machines. So far as quality of the product is concerned, both thoroly understand what they are doing, and one can make no mistake in purchasing from either. Aside from these firms mentioned, I happen to know of a specialist along this line, who makes saw blades in very tiny diameters, as small as ¼", and from there on up to 10". This firm also manufacturers special saws on order.

A special type of saw blade is used on milling machines for the slotting of screws, for this is a milling machine job that must be carefully governed. These are fine-toothed saw blades, and may be obtained quite readily. Saws are sometimes required with staggered teeth, and in the case of slitting copper, special formed teeth are required, since copper and similar soft metals are very difficult to slit with an ordinary type of saw. The chip is likely to spread and clog under the thrust of the teeth. Some saws for this purpose have part of the teeth V-shaped, in order to split the chip in the middle, after which the flat teeth come along and clean out the remainder more readily. In addition, the sides of these

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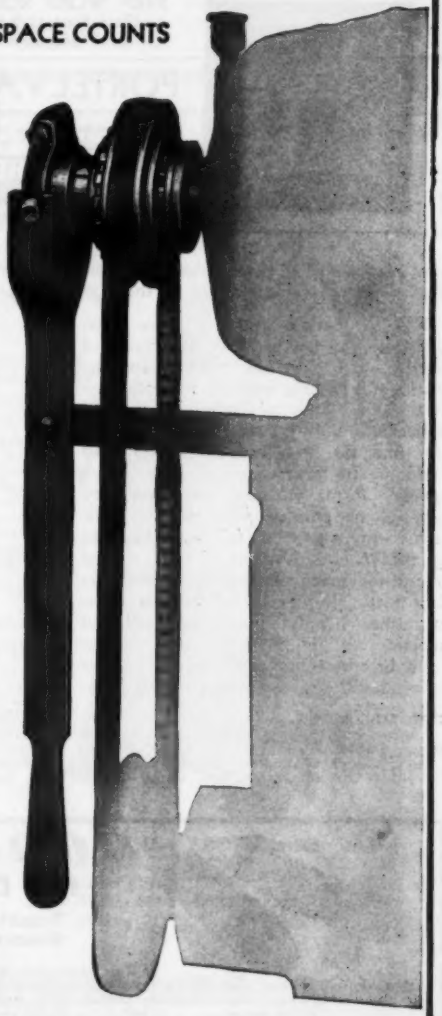

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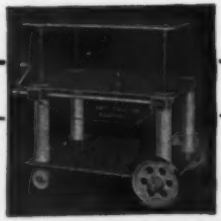

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saw blades are ground concave in order to prevent any binding in the cut.

Milling machine cutters have even been designed and built by some of our most progressive cutter manufacturers, for milling out the material between the tines of forks. You will appreciate that in order to do such a job and do it right, the cutter will need to be of a carefully controlled special form, to give the necessary tapered or pointed form to the fork tines. In articles to follow, I hope to go into a consideration of other forms of milling machine cutters, of modern-day cutting materials, of various types of milling machines both standard and special, and of methods and devices used in connection with them in order to realize their advantages to the full.

EDITORIAL NOTES:—

Inserted-tooth milling cutters are made by Brown & Sharpe, Providence, R. I., Barber-Colman Co., Rockford, Ill., Gairing Tool Co., Detroit, Mich., McCroskey Tool Corp., Meadville, Pa., Pratt & Whitney, West Hartford, Conn., Ex-Cell-O Corp., Continental Div., Detroit, Midwest Tool & Mfg. Co., Detroit, Genesee Tool Co., Fenton, Mich., Victor Machinery Exchange, Inc., New York, Murchey Machine & Tool Co., Detroit, Mich. Fairing makes them with cutters of highspeed steel, Stellite, or tipped with cemented carbide as noted. Brown & Sharpe have the tooth mounting and removal system outlined.

Thread milling cutters are made by Barber-Colman Co., Rockford, Ill., Murchey Machine & Tool Co., Detroit, Mich., Duralo Tool Works, Danville, Ind., Pratt & Whitney, West Hartford, Conn., Armstrong Brothers Tool Co., Chicago, Midwestern Tool Co., Chicago, Union Twist Drill Co., Athol, Mass.

Sprocket cutters as mentioned are made by Barber-Colman Co., of Rockford, Ill., and Brown & Sharpe, Providence, R. I.

Milling machine cutters of the staggered tooth type as described are made by Morse Twist Drill & Machine Co., New Bedford, Mass., Barber-Colman Co., Rockford, Ill., Brown & Sharpe, Providence, R. I., and others.

Interlocking side cutters as mentioned are made by Barber-Colman and by Brown & Sharpe. The spacing collar for milling machine arbors, adjustable by thousandths, is made by Dayton Rogers Mfg. Co., Minneapolis, Minn.

Formed cutters of all kinds are made by Barber-Colman, Brown & Sharpe, Pratt & Whitney, West Hartford, Conn., Genessee Tool Co., Fenton, Mich., Illinois Tool Works, Chi-

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3/8" ..... 1.35 " "
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cago, Ekstrom, Carlson & Co., Rockford, Ill., Carboloy Co., Inc., Detroit, Ex-Cell-O Corp., Detroit, Gairing Tool Co., Detroit, Midwest Tool & Mfg. Co., Detroit, Genesee Tool Co., Fenton, Mich., Hardinge Bros., Inc., Elmira, N. Y.

Gear cutters are made by Barber-Colman, Pratt & Whitney, Brown & Sharpe, Illinois Tool Works, Michigan Tool Co., Detroit, W. C. Lipe, Inc., Syracuse, N. Y., Fellows Gear Shaper Co., Springfield, Vermont, and others.

Metal slitting saws are made for milling machines by E. C. Atkins & Co., Indianapolis, Ind., Simonds Saw & Steel Co., Fitchburg, Mass., Barber-Colman Co., Rockford, Ill., and by Brown & Sharpe, Providence, R. I. The saw specialist making saws as small as ¼" dia. up to 10" inches, is the Circular Tool Co., Inc., Providence, R. I.

Screw slotting saws are made by Barber-Colman, Brown & Sharpe, Page Slotting Saw Co., Toledo, O., E. C. Atkins & Co., Indianapolis, L. S. Starrett Co., Athol, Mass., Simonds Saw & Steel Co., Fitchburg, Mass., Henry Disston & Sons, Inc., Philadelphia, Pa., Circular Tool Co., Providence, R. I., and others.

Staggered tooth and formed saws for copper slitting, also special saws for various types of work are made by Barber-Colman, Brown & Sharpe, and by Circular Tool Co., Inc., Providence, R. I.

A special milling cutter for milling out material between the tines of forks was developed by Brown & Sharpe, Providence, R. I.

(TO BE CONTINUED)

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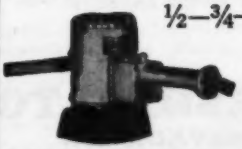

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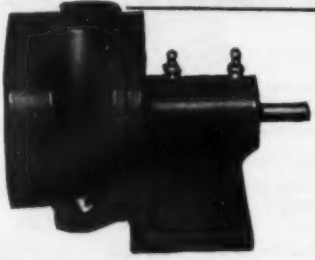

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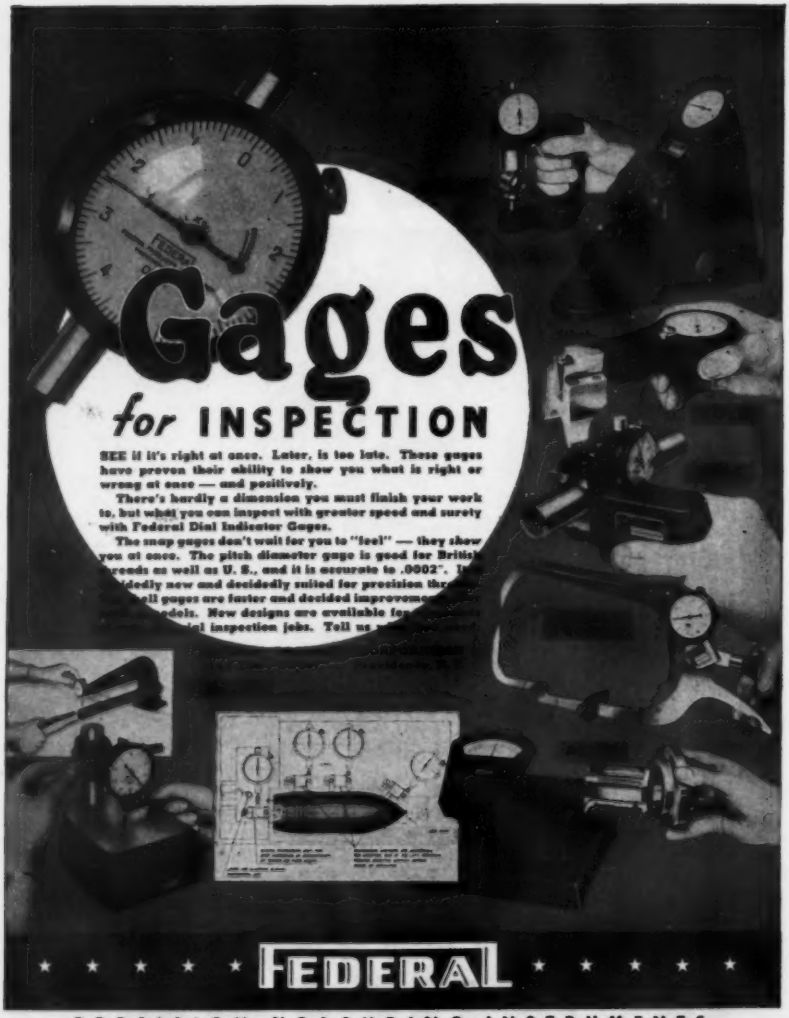
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Cast Iron Welding

By ARTHUR HAVENS

Welding rather than brazing, saves valuable brass and provides a satisfactory job.

AS I visit many shops, I find frequently that cast iron parts are being repaired with bronze. Unquestionably such repairs are as reliable as those made with the parent metal. In normal times, when no thought need be given to the cost or to the quantity of rod available, no one would question the brazing of cast iron parts.

But there is an increasing scarcity of bronze and it is high time to take stock of the situation.

There are instances where bronze cannot be replaced with any other metal; so let's weld cast iron with cast iron and in this manner conserve our bronze supply for the places where it is urgently needed.

Off hand, the number of cast iron parts say on a locomotive seem few. However, a day seldom passes without some cast iron part finding its way to the welder's bench. My own experience has been mostly in railroad work, but the examples I shall cite can be applied to many other fields that use cast iron.

The heavy braces that keep the pilot upright and take the shock when minor obstructions are encountered on the track; these are often found broken after accidents. Sometimes these braces are brazed but more often they are discarded. Now, with a shortage of both bronze and new castings facing us, damaged castings can and must be welded with cast iron rod. Castings welded in this manner will be found fully as serviceable as new ones. In its heaviest part, the pilot brace is about 1¼" thick. The simplest way to prepare the casting is to block it up on the welding bench so it will remain in position and then to melt out the crack or fracture. The melting out process will preheat the weld sufficiently so that when the crack is completely melted out, it will be hot enough to weld. The V thus formed is filled with cast iron rod.

Cylinder cock operating lever brackets are often broken. Located as they are in front of the cylinder saddle, any accident happening to the front of the locomotive breaks either one or both of these castings. This is a simple bracket type casting, carrying the bearing for the cylinder cock rod. Melting out this casting is almost a "must" because it has to align perfectly or the rod will bind. Cast iron parts, when broken, usually can be fitted back together easily because the edges do not bend and tear as is the case with most

steel castings. This bracket is handled in the same manner as the pilot brace, namely, melted out and filled with cast iron welding rod.

The cast iron safety bracket under the transverse equalizer is often found broken. Altho these castings are usually brazed, they can be welded with cast iron rod with no added expense and with the expectation of a satisfactory job.

Worn duplex distributor tubes can be reclaimed with cast iron rod. The abrasive action of the coal on the bottom of the tube wears viciously in this spot, sometimes cutting a hole completely thru the tube. If worn tubes are removed before the wear is excessive, these tubes can be rebuilt to serve as good as new ones. This is an excellent cast iron application that is seldom practiced.

There's no mystery about cast iron welding—just a few simple rules to be followed.

It is not uncommon to see cast iron floating bushings discarded because of excessive lateral wear. These bushings may be repaired quickly with cast iron welding. Naturally the operator will have to take particular pains in applying the cast iron rod to any part that must be machined after welding. The deposit must be soft and free from blow holes so that the resulting machined surface will resemble that of the original casting.

To grain this end, the casting must be heated thoroly before attempting to deposit any welding rod. During the welding, the oxide that forms on the surface of the weld will be partially dissolved by application of cast iron welding flux. The balance of the oxide must be scraped off with the tip of the welding rod. If these tiny particles of oxide are not removed or floated to the surface of the weld they will cause blow holes and a subsequently porous weld.

The continued action of the push rod in the brake cylinder wears the guide hole in the non-pressure head and it is not unusual to find this hole as much as 1" over size. The resulting worn guide hole is apt to be any shape from nearly round to oblong. It is common practice to replace this wear with bronze, but cast iron will serve just as well in this spot. Of course, the welder who uses bronze on these heads may claim that he can keep the hole more nearly round when using bronze. However, by moving the head often, the cast iron can be built in satisfactorily. Very few welders seem to know about using an old file on cast iron jobs of this type. When the welding is completed, the hole is left slightly smaller than the desired size. A large half round file is gripped firmly in the right hand and the surface of the weld is warmed with the torch held in the left hand. As the surface of the weld becomes slightly molten, the operator makes two or three quick passes across the surface with the file. Some of the molten metal is removed with each pass of the file and the resulting surface should be quite smooth. The metal that adheres to the file can be removed easily by knocking the file sharply against the welding bench.

This process is continued around the hole in the non-pressure head until the push rod enters easily. The head is

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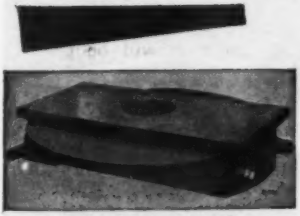

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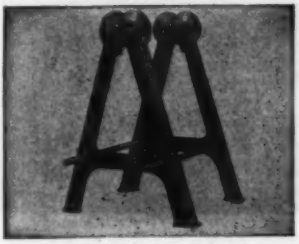

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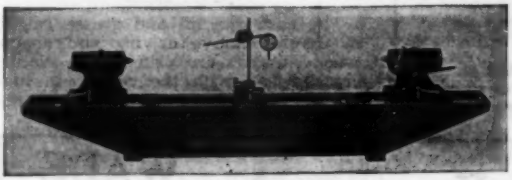

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RIGIDMILS • STUB LATHES
Drilling and Centering Machines • Hydraulic Operating Equipment

then placed in stock and is ready for many years of service.

Altho the cast iron steam pipes in the front end of the locomotive do not give trouble, often, there are times when these pipes do fracture and break off. The break usually occurs near the top or bottom flange. This is another place where cast iron welding can be highly sucessful. The crack should be chipped out all of the way. Scale and rust are removed from an area at least 1" on either side of the V. The end of the pipe is heated with the blowpipe sufficiently to relieve the stress and then the V is filled with cast iron rod. When the welding is completed, end of the steam pipe is again heated and left to normalize to room temperature.

A properly made cast iron weld should be as easy to file or machine as the parent metal.

The cast iron oil and grease cellars of the locomotive driving and engine truck boxes are sometimes found cracked and with the cellar pin lugs broken off. These cellars can be re-

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Save tooling time. Build your fixtures around a completely pre-designed drill jig body.

Save production costs. Savings up to 60% in drilling time not uncommon. Lever locks work instantly—holds securely. Throw it back and work is released. No complicated adjustments. Save cost of expensive drill fixtures—just a bushing plate and adaptor needed for each job.

Order today. Please include contract number or priority certificate. *Write for bulletin.*

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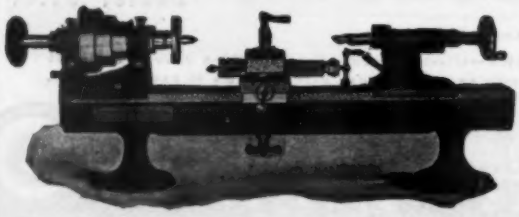

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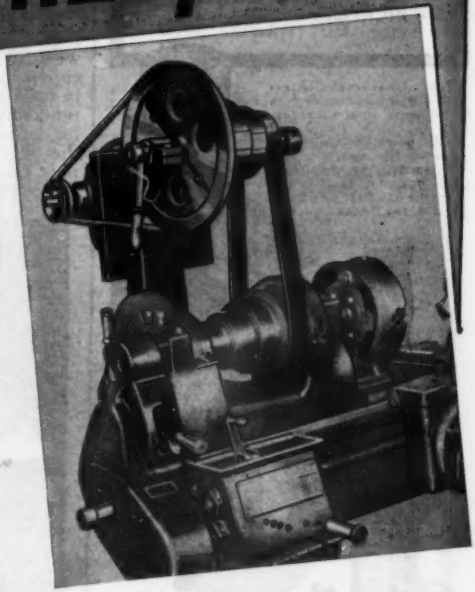

The Steege Motor Drive is the only drive built with a floating cone which automatically lines up the flat belt at all times. It is constructed of semi cast steel throughout, with as few parts as possible . . . a size built for each machine. Like the machine itself, each size is increased in strength to stand the most rigid demand that the operation might inquire.

The column, is cast of solid piece with five board holes to bolt to the machine.

The Bracket like the column, is constructed of one solid piece, machined to fit the turned part on column with the motor hung on one side of the column, and the cone on the other, evenly distributing the weight. The Bracket is so designed that it can be moved up and down with the adjusting screw to set the cone belt at the proper tightness.

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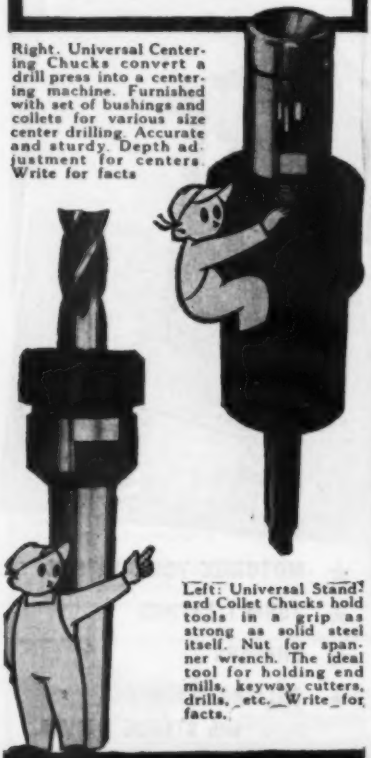
UNIVERSAL CENTERING CHUCKS AND STANDARD CHUCKS STEP UP ACCURACY —INCREASE SPEED



Right. Universal Centering Chucks convert a drill press into a centering machine. Furnished with set of bushings and collets for various size center drilling. Accurate and sturdy. Depth adjustment for centers. Write for facts

Left. Universal Standard Collet Chucks hold tools in a grip as strong as solid steel itself. Nut for spanner wrench. The ideal tool for holding end mills, keyway cutters, drills, etc. Write for facts.

UNIVERSAL
ENGINEERING COMPANY
FRANKENMUTH, MICH.

paired easily with cast iron. When the cellar is cracked it is melted out with the torch. After the melting operation is completed, the entire oil or grease cellar is heated sizzling hot. The crack or cracks are then welded with cast iron rod and the cellar warmed thoroly again.

In the case of a broken lug, no heating other than that needed for the welding is required. A piece of round carbon is ground to the size of the hole in the lug. This is placed in the groove remaining from the broken lug and the lug is rebuilt with cast iron rod. When the welding is completed the carbon plug can be removed easily with a few sharp blows from a hand hammer.

A wide variety of jobs, formerly brazed, can be welded and much valuable brass saved.

Altho bolt lugs on the cast iron air brake reservoirs are heavy and not under any considerable strain, they are frequently broken off. Cast iron welding makes an excellent repair for these broken bolt lugs. As a rule, the entire piece near the hole is broken away, leaving no clue as to the exact loca-

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WITH NO "LAND"

ONE MACHINE • ONE SET UP • ONE OPERATION

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1. Dress the face of the grinding wheel so it has exactly the same curve as the tool to be ground.
2. Offset the tool from the center of the curve of the wheel to give desired clearance.
3. Grind clear to the cutting edge.

THIS IS ALL DONE IN ONE OPERATION

Because the tool has been ground with the circular relief exactly the same as the curve of the tool, the outside of the tool is left convex. Therefore, all the metal possible has been left behind the cutting edge to give it maximum support, and the tool longer life.

The degree of clearance is determined by the distance the tool is moved in or out against the curved face of the grinding wheel.

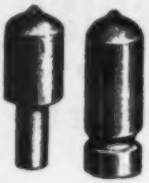
Here is a compact machine, taking up 2 ft. x 6½ ft. floor space, with 7' swing by 26' long on centers—Motor 110V—60 cycle single phase—that may be plugged in any socket.

WRITE FOR COMPLETE DETAILS

Comparing Conventional Grind with Circular Relief Grind

THE CLEVELAND TOOL ENGINEERING CO.

9200 DETROIT AVE., CLEVELAND, OHIO



FOR DEFENSE

KARELSEN'S DIAMONDS KEEP THE WHEELS OF INDUSTRY TRUE

DIAMOND POINTED EMERY WHEEL DRESSERS

¼ KT. TO 10 KT.

IMMEDIATE SHIPMENT

Send for Prices *Specify Holder*

"If its made of Diamond—Ask us First."

E. KARELSEN, INC. *Established 1852* 56 W. 45th St., New York, N. Y. Tel. VAN. 6-5658

tion of the bolt hole. The entire area missing must be replaced, the bolt hole position being determined later from the blue print. Then the hole can be drilled in a drill press. For this reason, no carbon plate can be used to back up the weld for the carbon pick up in the weld might render it too hard for drilling or any machine work. Instead, the broken reservoir is laid on its side with the base at right angles to the bench and the missing or broken edge upright. It is then rebuilt with cast iron rod to the required size. No doubt the resulting weld will be thicker than needed. Here again the file process mentioned earlier comes to the fore. After the excess metal is removed, the base is finished by subsequent heating and filing until the weld is flush with the rest of the base. This reservoir, when drilled, can again be applied to the locomotive tender of car without further machining.

So far I have just mentioned locomotive parts but this is far from all the cast iron welding that the railroad welder can and should do. He must weld all of the many broken machine parts in the shop and engine house and these are numerous. There is rarely a day that some machine hand doesn't find his way to the weldery job with a broken handle or crank or some other small part of his machine. The welder quickly grinds or melts out the break and fills it in with cast iron rod.

Very often a welder's ingenuity with torch and cast iron rod will save long delays in waiting for parts to be cast. A splendid illustration of this happened in a small outlying engine terminal.

One of the men operating the coal chute came in the engine house and sought out the mechanic welder. He had with him a cast iron gear about 2½" thick and 4" in diameter. In some manner, the gear had fouled and stripped the teeth from about 2/3 of the circumference. The rest of the teeth were still all right. Apparantely they had never been in mesh. Removal of this gear necessitated shutting

Micro Supreme **IMPROVED** **LAY-OUT DYE**

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LOW IN PRICE

for TOOL, DIE, PATTERN, OR TEMPLATE LAYOUT ON METAL

One Quart..$1.50
One Gallon..$4.25 Five Gallons..$18.75

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8330 East Jefferson Avenue • • Detroit, Michigan

Saw-way MULTI-PURPOSE INTERNAL GRINDER

Headstock moved back and at angle position for grinding tapered hole.

Looking down on top of machine from grinding spindle end.

Offers greater flexibility . . . a precision grinder, designed and built by engineers with years of practical experience to guide them . . . has a headstock traverse of 6″ . . . grinds holes ¼″ to 18″ in diameter . . . holes up to 9″ deep, straight or tapered . . . entire headstock may be moved at right angle to wheel traverse, by merely loosening two conveniently located nuts . . . worm compensating device permits grinding wheel head adjustment to .0001 . . . sturdy construction throughout . . . full specifications, delivery time and price on request.

Distributors throughout the U. S. and Canada to serve you.

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Need those light stampings
NOW?

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Are you "held up" for want of punch press time on light stampings and trimmings? Then perhaps you'll be glad to know that we're featuring thirty day deliveries on ROUSSELLE Punch Presses in order to help solve problems such as yours. So keep those heavy presses going on heavy work—and start a high-speed-with-safety ROUSSELLE rolling on your small parts and light work. Made in 3 sizes—No. 0, No. 1 and Horn model . . . Write, wire or phone for quick information.

Distributors: A few select territories still available.

DAVID J. ROSS CO.
BENTON HARBOR, MICH.

down of the coal chute and it could not run again until the gear was repaired or a new one put in its place. No locomotive could be coaled without the chute. It was a serious situation.

The welder looked carefully at the gear; to rebuild the worn section would be quite simple; but how could the teeth be cut in the welded gear for there was no machine in the entire village for that purpose. Walking into the small machine shop equipped with an antique lathe, a drill press, and a couple of emery wheels, the mechanic surveyed the possibilities. Each tool was scrutinized and eliminated until his gaze rested on the small emery wheel. Remembering that there was a very narrow emery wheel in the cupboard near by, the mechanic procured it and installed the wheel on the arbor of the machine. He found the diamond wheel dresser and began the tiresome job of cutting the emery wheel to fit the pitch of the gear teeth that were undamaged. After determining that this could be done, he proceeded to built up each tooth on the gear with cast iron rod, alternating from one side of the gear to the other to avoid running the teeth together. When the gear was cool enough to handle, be began the tedious job of grinding out between the teeth and shaping to the guide provided by the still intact section of the teeth. Naturally this was a long slow process and required many wheel dressings but in a few hours the coal chute was again in operation and no harm had come from what might have been a serious shut down.

It is not unusual for welders to do jobs of this type for they are forever being called upon to get someone out of the woods. Is cast iron welding on the railroad a lost art?

In the hands of a skilled mechanic, hardly any job is impossible.

"KEEP 'EM ROLLING"

Buy U. S. War Savings Bonds and Stamps

Grind ALL YOUR OWN TOOLS

to Perfect Sharpness and Cutting Uniformity

★ with a ★

HILCO
Portable
GRINDER

SPEED ECONOMY
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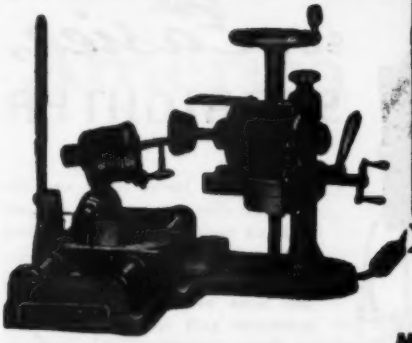

GRINDING END TEETH OF END MILL
—One of many adaptations

Sharp Tools
Mean Increased Production —
Greater War Effort

Carry to Any Department!
Use on Any Bench!

End mills, reamers, milling cutters, saws, drills — all cutting tools regardless of shape — may be ground to absolute sharpness and uniformity in your own shop, at your own convenience with the HILCO PORTABLE GRINDER. Exclusive HILCO universal head with 7 index circles provides perfect flexibility.

The HILCO GRINDER performs with utmost accuracy, top speed and lowest cost — eliminating expensive delays, waiting losses, time-consuming set-ups.

Priced at **only $395.00,** it out-performs grinders costing many times more.

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Tannewitz DI-SAWS

have LARGER CAPACITY, saw *Easier*, STRAIGHTER

In making inside and outside cuts on dies, tools, jigs, etc., as well as inside and outside filing and polishing, the modern die saw will save upwards of 70% of the time required by ordinary methods and reduce costs proportionately. Don't overlook this great opportunity to step up both production and profits. But be sure to get the machine that gives you the added advantage of EXTRA CAPACITY (a full 24 inches between the blades) and the easier and straighter cutting that naturally follows from the use of larger wheels. Get the complete facts concerning the TANNEWITZ M-24, the most highly developed die saw on the market. Simply write for our DI-SAW Bulletin. Also describes larger DI-SAWS for special applications.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

Investing 10% in America

FOLLOWING a broad program to put the power of an organized promotional campaign behind the Payroll Savings Plan, the U. S. Treasury Department has made available to nearly every business firm in the country, a complete set of promotional material.

All this material is designed to help business firms achieve more quickly, the goal of at least 10% of Payroll invested in War Savings Bonds.

Nearly 100,000 of the nation's business firms have already installed, and are operating under this plan which permits systematic purchases of War Bonds by employees thru voluntary allotments from each worker's pay envelope. In most cases, management of the company absorbs the entire cost of administration and bookkeeping—and the plan is so simple in its operation that this expense is normally quite modest.

Experience has proved that the Payroll Savings Plan is most effective when stimulated by a well planned, fast-moving program to explain operations and benefits of the plan and see that it is properly sold to each employee.

Accordingly, the War Savings Staff, with the voluntary assistance of some of the nation's ablest advertising and merchandising men, has prepared and made available complete sets of material that will assist every company in putting on a sustained and successful drive.

The first item in this group of material is a book titled "A Plan For Diverting at Least 10% of America's Payroll into U. S. War Bonds." This book outlines the basis for the overall campaign and explains the general types of material available.

For the benefit of businesses that may not have installed the plan, there is another booklet called "How to Install and Successfully Operate a Payroll War Savings Plan for the Regular Purchase of U. S. War Savings Bonds." This booklet explains in simple clear-cut terms how simple and easy it is for any business organization to make the benefits of Payroll Savings available to its workers.

Basic book for the employee is the one "Give 3 . . . Get 4!" In addition to explaining how money saved by workers is of vital importance in winning the war, it drives home the sound practical benefits each worker will gain by having a reserve fund saved up for post-war years. It also answers ques-

tions that may be in the worker's mind as to the value of War Bonds as an investment.

Three small envelope stuffers, to be distributed via the pay envelope, are also included. They are designed to keep the subject fresh in every person's mind; to pre-sell workers so that the "Campaign chairmen" will be able to turn in the highest possible percentage of signed authorizations for payroll allotments from the workers they approach.

To give each worker tangible evidence of his participation in this "All America" program, lapel buttons are furnished reading, "I am buying at least 10%." Window stickers with similar copy are provided for the worker's home.

When the entire business has signed up for a minimum 10% payroll, it is authorized to acquire and display the official Treasury Department Target Flag.

This material is distributed thru offices of the War Savings Staff's State Administrators. Any company desiring to get a plan rolling at once is invited to call their local State Administrator's office and request quantities as needed.

Planned promotional programs have proved their value over and over again, in all types and sizes of business organizations. The Treasury Department is harnessing this proved productive method to bring to a speedy conclusion, successful Payroll Savings drives in every business thruout the land. Industry, workers and the nation will benefit as a result.

THE 1st
REALLY HIGH-SPEED GRINDER
WAS
KIPPair GRINDER
NOW THE NEW MODEL
H
KIPPair GRINDER
Madison-Kipp tool-makers originated the first really high speed grinder. They know a great deal about the practical side of grinder design and grinder usage. They think the new Model H is the best all around off-hand tool they have ever tried and we are sure you will agree with them. It's fast (50,000 R.P.M.), more powerful, and has a handier grip.
If you are doing priority work, Order Today!
Please attach preference rating certificate with order.
29.75
MADISON-KIPP CORPORATION
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Have you our Engineering Data Sheets on the new line of
BABY GUSHER
Machine Tool Coolant Pumps?
Made in four types; 1/30 and 1/10 h. p. for small machine tools and machines requiring from 4 to 10 G. P. M.
Write for descriptive literature.
The Ruthman Machinery Co.
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THE NO. 3 WIGGLESWORTH SMALL MILLER

A NEW HIGH SPEED SMALL PARTS MILLER WITH AUXILIARY POWER FEED

MOTOR IN BASE DRIVE • TIMKEN BEARING SPINDLE
SIX FEEDS AND SPEEDS • BUILT IN ACCURACY

WRITE FOR FOLDER

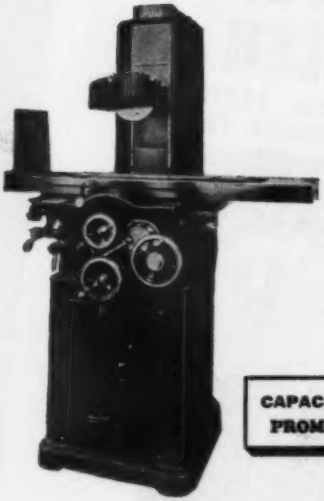
WIGGLESWORTH MACHINE TOOL CO.

191 BENT ST. CAMBRIDGE, MASS.

ATLANTIC

No. 2 Automatic Precision Type

SURFACE GRINDER



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POPE—S.K.F.

SELF-CONTAINED

SPINDLE

CAPACITY 6' x 12' x 18'

PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.

149 BROADWAY, NEW YORK, N. Y.

Accessories

Ready availability of a generous number of well-selected machine accessories is responsible for high overall efficiency in many plants, when the reason for their success cannot at once be seen by the casual observer. For instance, one plant has a first-class demagnetizer, so the trouble of residual magnetism in tools that have been handled on magnetic chucks is at once eliminated. Another has a universal milling head which can be applied readily to the horizontal miller for showing real speed in jig, die and fixture work. A shop across the street, may be equipped with a new type of tool called a Center Scope, which allows it to center work under a spindle quickly and with extreme accuracy, while a metal products company, down the street, has invested in a device that will transform its bench lathe into a milling machine, suitable for making many light and intricate milling cuts.

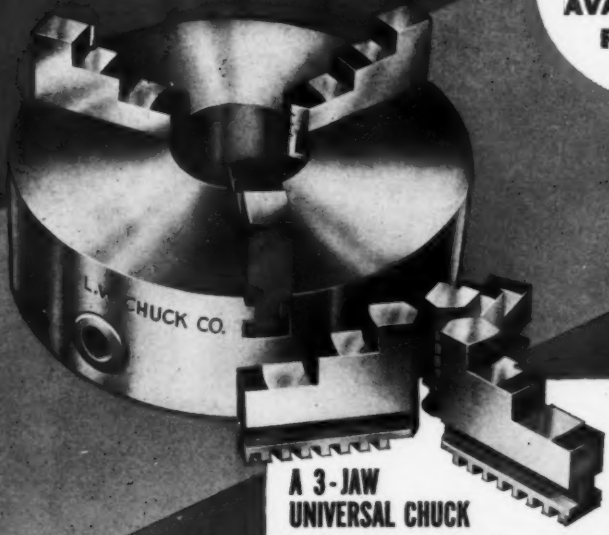
The only difference between those who have such devices and those who have not, basically, is alertness. True, the more progressive firm which has learned to reap the benefits of such accessories as are particularly applicable to its business is also the more prosperous. But the prosperity is the effect, while the alertness is the cause. Competitors who may have been described as "lucky," get that way by keeping eyes and ears open. Generally, they study current trade magazines more intently month after month. As a result, they know what is new and are using newer and better methods. How are you going to compete?

L-W LATHE CHUCKS

3-JAW UNIVERSAL GEARED SCROLL

$75.00

ONLY 10½ SIZE AVAILABLE AT PRESENT



A 3-JAW UNIVERSAL CHUCK

Combining strength with accuracy making it readily adaptable for either light or heavy duty work.

* Body-semi steel casting, ruggedly designed for maximum strength
* Jaws-Steel, hardened and ground, accurately fitted. Set of reversible jaws furnished.
* Scroll and Pinions-Made of high grade steel, accurately cut. T handle wrench furnished.

This chuck is guaranteed to run true, is desirable for either Lathe or Screw Machine work.

Also Mfr's of Ind. Lathe Chucks Dividing Heads Power Hack Saws Magnetic Chucks Demagnetizers Milling Mach. Vises

L-W CHUCK CO.

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FINISHING THE JOB

HI-POWER GRINDER

A real production grinder that is saving many man hours. Weighs 3 lbs., yet is so well balanced that fatigue is practically eliminated. Has enough power to drive a 2½" diam. wheel. 17,000 r.p.m. In case with 3 Chicago Mounted Wheels, Drum Sander and Bands, extra Collets,

BEHIND THE LINES..

CHICAGO MOUNTED WHEELS

HB-8

☐ *Send Hi-Power* ☐ *Catalog*
☐ *Free Wheel* *Size*.....

Name .....

Address.....

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HI-POWER GRINDER

A real production grinder that is saving many man hours. Weighs 3 lbs., yet is so well balanced that fatigue is practically eliminated. Has enough power to drive a 2½" diam. wheel, 17,000 r.p.m. In case with 3 Chicago Mounted Wheels, Drum Sander and Bands, extra Collets, Wrenches, Pamphlet, Stones $38.50

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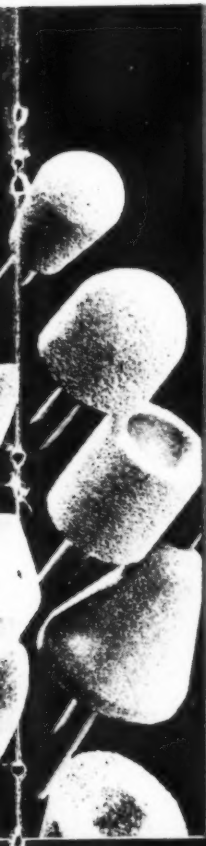

● Keeping up with Uncle Sam's victory drive for more tanks and guns and planes, Chicago Mounted Wheels are doing a big finishing job in shops everywhere—taking care of every kind of delicate or tough grinding job faster, smoother and better.

CHICAGO MOUNTED WHEELS

Made of V/T Super Bond, they have real stamina, give unmatched performance and last 150% to 300% longer than ordinary wheels.

Chicago Wheels were the first small wheels mounted on steel shanks. Today there are over 200 different shape wheels to serve you—made in a variety of abrasives, grains and grades, mounted on shanks of various lengths and diameters of ¼", 3/32", ⅛" and 3/16".

TRY ONE ABSOLUTELY FREE

Tell us the kind of job, size and wheel speed you use, and we'll send you a test wheel postpaid.

BRAND NEW CATALOG

Just off the press, this book is prepared in the modern manner – loads of illustrations, concise descriptions of the complete line of Chicago Mounted Wheels.

CHICAGO WHEEL & MFG. CO.

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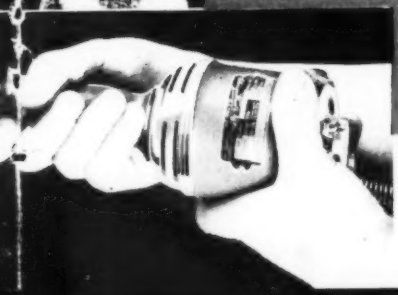
1101 W. Monroe St., Dept. HB, Chicago, Ill.

Canadian Distributors: Canadian Trade Corp., Ltd., 1232 Williams St., Montreal

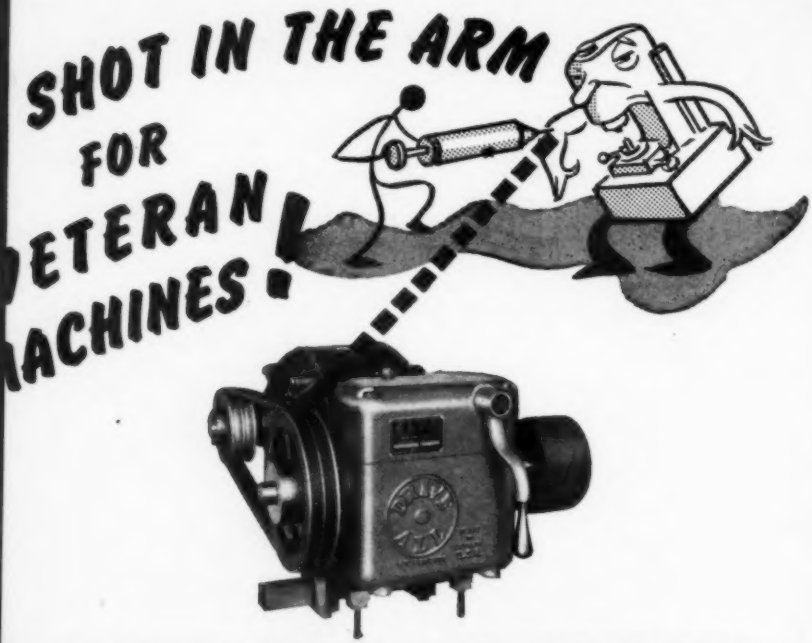


HB 5

Send Hi-Power Catalog
Free Wheel Size

Name

Address



GET HIGHER SPEEDS--HEAVIER FEEDS

with DRIVE-ALL Machine Tool Transmissions

The press of production right now calls for the maximum output from every machine—old or new. Many older machines can be made more productive by individual motorizing through DRIVE-ALL variable speed transmissions. This sturdy, compact gear box assembly can be quickly installed and machine control vastly improved. The DRIVE-ALL system is *engineered* to machine tool requirements. Wide speed range covered. 17 different models and sizes to suit your own requirements. Available with clutch.

Write for New Catalog.

)RIVE-ALL MANUFACTURING COMPANY

Broaching Machine Folder

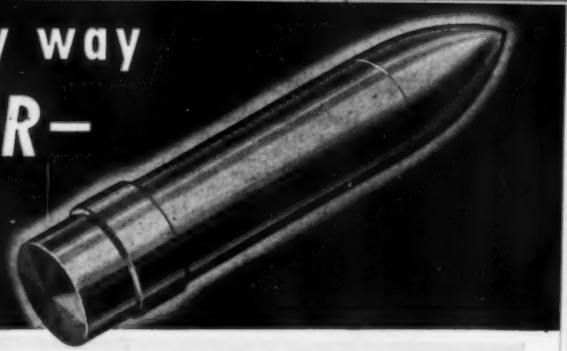
Model "HAS" Universal Horizontal Broaching Machines manufactured by Colonial Broach Co., Detroit, Mich., are described in a new 12 page folder. Features of 12 machines in the standard line are covered, including large face-plate, motor and pump mounting, simplified hydraulic system, etc.

Descriptions of typical applications of horizontal broaching, complete specification tables and data on equipment available for special broaching operations are also included, such as information and tables on Broach Drive Heads, Roller Follow Rests, and Chip Troughs.

The standard line of machines covers sizes with normal ratings from 3 tons, 36" stroke up to 25 tons, 90" stroke. Peak pulling capacities range up to 71,300 lb., driven by motors ranging from 7½ up to 40 hp.

DUBLIFE
PLUG GAGES LAST TWICE AS LONG AS ORDINARY GAGES
"UPPCO FINISH"
ASSURES EXTREME HARDNESS AND ACCURACY
The handle is made of hexagon material with bronze tapered collet which locks around the plug as it is driven into the handle. The plugs are reversible, so that when one end is worn out the other end may be used, thus giving double life. 30,000 gages in stock ranging from .030" to 1".
Catalog showing DUBLIFE and other gages of American Gage design will be sent on request.
ORIGINATORS and exclusive manufactures of DUBLIFE GAGES and UPPCO FINISH
UNITED PRECISION PRODUCTS CO.
4618 W. HURON ST., CHICAGO, ILL.

I'm on my way SOONER— because



TRU-LINE TOOLS dress centerless grinding wheels with amazing speed and accuracy!

Shot, shell and projectile forms are rolling off production lines much faster these days because Tru-Line Tools eliminate all the defects and delays incidental to using single diamond wheel dressing tools.

Once positioned to the wheel the Tru-Line Tool needs no resetting, no turning and no changing until the diamonds are completely used.

The desired wheel form is easily obtained with absolute accuracy and, because every dressing is right the first time, there is great saving in down-time. The wheel is cleaner and freer-cutting and produces many more uniform pieces between grindings.

Savings in wheel cost may be 50% because fewer dressings are needed and fewer passes per dressing.

Tru-Line Tools are available for fast production of all shot, shell, and projectile forms that are centerless ground.

Send for illustrated folder describing the revolutionary, patented Tru-Line Principle, and engineering data sheets.

COVERED BY U. S. and FOREIGN PATENTS

No. 2-W

No. 333

WHEEL TRUEING TOOL COMPANY

3216 W. Davison DETROIT Established 1910

"Let's Talk Shop!"

COTTON BAGS IN WORK EXPEDITION

By H. H. Roads, General Manager, The Ames Bag Co.

THE FIRST cotton bags for industrial use were made in 1914 from scraps left over from the manufacture of salt, sugar, flour, feed and fertilizer bags. Today, the use of cotton bags in the field of materials handling has increased tremendously due to the ever increasing demand for more speed and efficiency in handling and shipping small parts.

The Yale & Towne Mfg. Co., is a timeworthy example of how cotton bags can speed production on the assembly line, and this company is just one of many who have found it advantageous to use these bags.

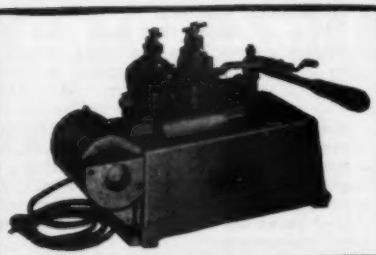
Yale & Towne use parts bags to group sub-assemblies which are then sent to main assembly lines. With cotton bags used in this manner it is possible to eliminate many minutes of wasted time on the main assembly line and greater production is the result.

All small parts for assembly of a certain part of a truck, including lock washers, nuts, cotter pins, lugs, fittings and light machinery parts, are placed in a bag or small group of bags in the stockroom. The paper tag which is sewed into the bottom seam of the bag is marked for quick identification and the bags are held in the stockroom until needed.

As the trucks and tractors move down the line to the point where these parts are needed, the bags of parts are sent to the line. There the assembly worker reaches for the entire group of parts with a single motion, shakes them into his hand with another motion, and then installs them rapidly and efficiently. Yale & Towne also uses mailing bags to ship repair parts to dealers, jobbers and other users of their equipment.

A new and rapidly increasing user of cotton bags is the aircraft industry, where a few years ago the use of parts bags and mailing bags was negligible. Today, several leading aircraft firms buy bags in large quantities and are constantly developing new ones for them.

Vultee Aircraft, Inc., sends parts in



BAND SAW WELDERS

The No. 141 Bench Type Metal Working Band Saw Welder is available with or without grinder. Work can be annealed without removing from the Welder. Band saws up to ¾" wide may be welded.

1 KVA—110 Volt—60 Cycle—single phase—5 point heat control—1 point anneal heat—Weight 40 lbs. Let us send you further details.

Mfrs. of complete line of Spot, Butt, Seam, Flash, Projection and Special Welders.

WELDEX INC., 7225 McDONALD AVE., DETROIT, MICH.

DYER

HEAVY DUTY SPOT WELDERS

Floor models 10 to 35 KVA.

6 point selective switch on all floor models allows for quality welds on various materials. Standard and Underwriters Labeled Machines.

3 point switch on bench models.

Bench models 3½ to 10 KVA...with or without pedestal.

Dyer Welders are available in a wide range of sizes and capacities—air, motor or foot operated, giving maximum production—simplicity of operation—power economy.

PROMPT DELIVERY

Few Territories Available.

THE TOPEKA FOUNDRY & IRON WORKS CO.

306-22 Jackson St., Topeka, Kansas

bags from manufacturing to assembly plant, where they go direct to the assembly line without being unpacked. This procedure saves much unnecessary handling. Shot weight bags are also used by this company.

Lockheed Aircraft Corp., uses parts bags to tie small parts to assemblies where they are at the fingertips of the workers when they are needed. Mailing bags are used for shipping small parts.

Another large user of cotton bags is the Stinson Aircraft Corp., which air mails replacement parts to airports where planes are regularly serviced and for all small parcel post shipments.

Time studies have revealed that the use of cotton bags with drawstrings saves up to 90 per cent of packing and crating time, while mailing bags with address tags save as much as 50 per cent of postage and packaging costs.

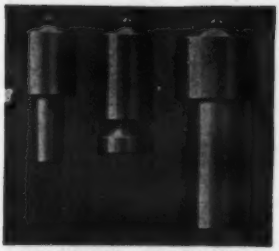
Use of envelope bags saves a considerable amount of time and confusion by making it possible to send samples right along with correspondence or purchase orders.

The most widely used cotton bag is the "service," "utility" or parts bag. It is used to tie small assembly parts to a product or its crate. This eliminates the time and cost involved in making special crates to accommodate protruding parts, saves the time and cost required by bulkier packing of the assembly parts, and eliminates possibility of losing parts in transit.

One of the recent developments of the bag industrv is a "multiple parts bag," made with two or more compartments sewed into the cloth. These bags are used to ship 2 or more fragile or polished parts together without danger of breaking or marring.

It is estimated that more than 50,000,000 cotton bags are used annually by industry, and this number is growing by leaps and bounds. And when you remember that this million-dollar industry started as a waste utilization project and grew on its own merit, almost wholly without advertising or promotion to its present status, you realize that cotton bags as a time and cost saver on the production line must be oustanding.

They may LOOK alike



LANDIS, NORTON, CINCINNATI NIRS

•

Shaped Tools ● Ascopoint Dressers
Valve Refacers ● Impregnated Dressers ● Diamond Pencils ● Phonopoints
Glaziers' Tools ● Tungsten Diamond Wheels ● Wire Dies ● Saw Blades
Core Bits ● Diamond Powder.

It takes the keen eye of a diamond expert to appraise the relative values of two diamonds that look exactly alike to the layman. When a reputable diamond dealer recommends a particular diamond, after a careful study of your requirements, you can be confident of receiving full value. Don't be misled by an offer from another, of a lower-priced stone that looks "just the same".

You can't afford "bargain" diamonds. Buy only from well-known concerns—in business to stay. Anton Smit & Co., Inc., one of the world's largest firms in this field, has, for over 30 years, enjoyed the confidence of many of America's leading manufacturers. An ASCO Diamond Tool pays for itself in a very short time. Tell us your needs.

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Salvaging Tools and Parts

Actual shortage has created considerable difficulty in replacing tools and machine components needed for production. Many parts are not available, or obtainable only after a considerable delay.

Welding is a solution to many situations of this kind. However, regular maintenance repair welding of such parts is not always successful. Since the parts are very different, special techniques must be developed to obtain good results.

The methods used mostly involve arc welding or oxy-acetylene welding. In both cases, high temperatures are required which may affect properties of the base metal, and alter sections adjacent to the weld. Further, sizes of the parts may be changed, and in many cases there may be warping and distortion.

A new process has proven very successful for salvaging tools and machine components. It is a low temperature process using specially alloyed welding rods and is applied with the oxy-acetylene torch, without injury to the metal structure. The operation itself is much simpler due to the fact that it requires heating the material

ALL ALLOY PORTABLE SHEARS
FULLY GUARANTEED
Two Sizes
No. 1 cuts up to No. 11 gauge strip or sheet.
No. 2 cuts up to ¼" steel plate.
Special Blades for shearing stainless steel.
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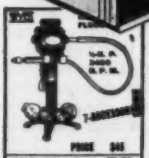

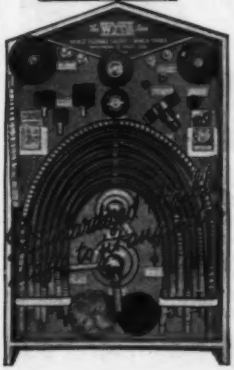

Delivers More Power AT THE POINT OF WORK

The Wyco Patented NON-METALLIC Inner Liner protects the core and assures smoother, cooler running, and longer life of the WYCO flexible shafts ... reduces friction and delivers more power at the point of work. Standardized units (interchangeable parts) and quantity production makes it possible to produce these better shafts at lower prices.

No matter what your flexible shaft needs: complete Flexible Shaft Machines, Replacement Shafts or Accessories, the WYCO line will exactly fill your requirements. Compare prices, we guarantee quality.

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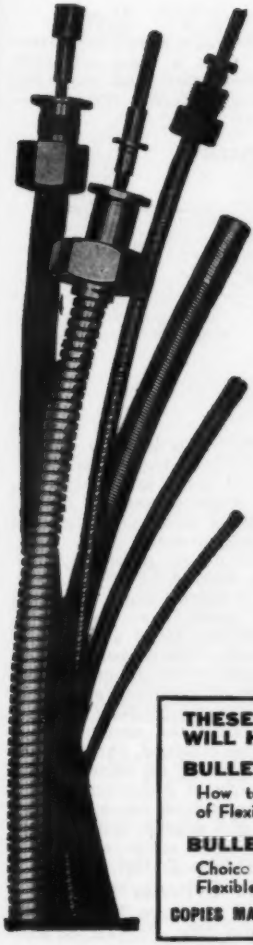
without having to melt it, adding a a low temperature melting metal, penetrating easily into the cracks, or filling the missing part. The whole operation is performed at several hundred degrees below the melting point of the part itself. Of further importance is the fact that this method can be used on cast iron of different grades, as well as on all steels, non-ferrous metals like brass, bronze, copper, nickel, nickel alloys, aluminum and alloys, and even die castings.

The new alloyed Castolin welding rods have a wide range of adaptability. Tensile strength is said to be as high as 117,000 lbs psi on steel, for instance. Color and physical properties are closely matched to the parent metals. The illustration shows a typical job.

A new technical data book on this process has been published recently by the manufacturers of Castolin, the Eutectic Welding Alloys, Inc., 40 Worth St., New York.

Speeding Rheostat Production

Helping to speed production at one of General Electric's industrial control factories is this ingenious arrangement, using an electrically heated carbon tip for the soldering of plate-type rheostats used for motor and generator control. The assembled rheostat plate is placed in a grounded ratchet fixture. The carbon tip is lowered into contact with one of the several rheostat but-



How to get best results

with

FLEXIBLE SHAFTS

In view of the wide and steadily growing use of S.S. White flexible shafts in aircraft, tanks, ordnance, naval, signal corps and other war equipment, the following may prove helpful.

To assure proper flexible shaft performance in any power drive or remote control application, it is essential to:

1. Select the right shaft for the job.
2. Apply the shaft properly.

Many factors determine shaft selection. But above all it is necessary to pick a shaft of the right type—power drive or remote control—the right size and the proper physical characteristics. The large selection of sizes and physical characteristics in which S. S. WHITE Flexible Shafts are made for each type of duty, makes it possible to get the right shaft for a wide range of operating requirements.

Proper application includes selecting the proper flexible casing to go with the shaft, use of proper end fittings on both shaft and casing, use of proper gearing where necessary, avoidance of too sharp bends and various other factors.

THESE BULLETINS WILL HELP YOU

BULLETIN 641
How to Make the Most of Flexible Shafts

BULLETIN 741
Choice and Application of Flexible Shafts in Aircraft

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Call on S. S. WHITE engineers for recommendations. Their long years of flexible shaft experience assure you of a prompt and authoritative answer.

S. S. WHITE

The S. S. White Dental Mfg. Co.
INDUSTRIAL DIVISION
Dept. H, 10 East 40th St., New York, N. Y.

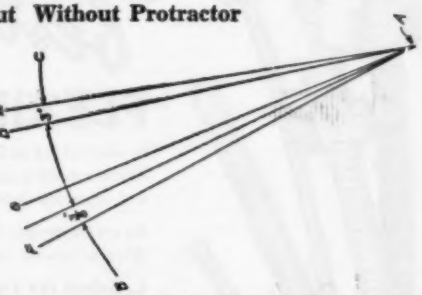
FLEXIBLE SHAFTS *for* POWER DRIVES, REMOTE CONTROL *and* COUPLING

tons to be soldered, the button is quickly heated, and the solder applied. The operator then rotates the plate by foot lever to bring other buttons into position for soldering.

Formerly this was a completely manual operation with a hand soldering iron, taking more time and requiring a great deal of soldering iron maintenance.

Rough Angular Layout Without Protractor

Did you ever get caught out somewhere without a protractor, and find yourself faced with the proposition of laying down an angle of certain value? In such cases, where the angle is one that can be readily sub-divided from a semi-circle, of course, one can make himself a protractor in the form of a semicircular drawing, from which angles such as 15, 30, 45 and 60 degrees may be readily obtained. When it chances to be an angle of smaller value, or one coming in between those mentioned, it is a different proposition.



I am showing rough sketch of a rule that may be used with the assurance that it will give a fair degree of accuracy. It may be used anywhere one can get hold of a compass or pair of trammel points. It will allow you to set off intervals of 3 degrees on a circumference, and these are readily redivisible into single degrees or readily added to standard angles like the ones mentioned, or subtracted from them, graphically, to obtain practically any angular value desired.

To find a 3-degree angle, take the compass and strike from any center A, a short arc BC, using a 7" radius. Take your scale, and measure off on the circumference or on the arc, a short chord, 3/8" long. Three such are shown set off on the drawing. Now, running straight lines from the center A thru the points thus obtained, three-degree angles are obtained. In other words, DAE is an angle of 3 degrees. Obviously, by stepping off spaces of 3/8", any multiple of 3 degrees is obtainable. For instance, FAG is an angle of 6 degrees. (By John E. Hyler).

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Assure:

- **Protection**
- **Increased Production**

Safety is assured by the exclusive JUNKIN TRIPLE INTERLOCK which locks presses until hands are safe. For safety, economy and efficiency equip your presses with Junkin Safety Guards. Recommended for all type inclinable and small presses.

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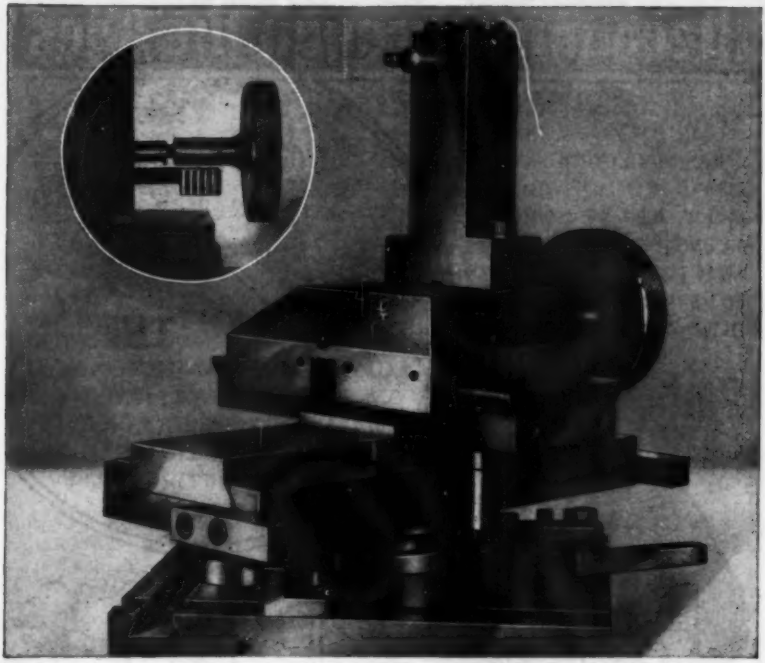
Pneumatic Cylinder Bulletin

Just released is a new Bulletin, No. 57, by Hannifin Mfg. Co., 621 S. Kolmar Av., Chicago, makers of pneumatic and hydraulic production tool equipment. Thruout its 52 pages the bulletin lists a full line of pneumatic cylinders, profusely illustrated, and accompanied by detailed drawings, specifications and convenient data. Hydraulic cylinders, air-control valves and accessory items manufactured by the firm are also detailed.

End "Check and Redress" . . .



with the New KOPEC!

Here at last is an angle tangent to radius dresser that can be adjusted quickly to *gage block accuracy* to secure innumerable contours.

Built-in sine bar eliminates visual errors. Rely on your gage blocks or micrometers for direct precision forms. Secure form results within a "tenth" on the first grind. Identical repeats all the time.

For fast, efficient, economical dressing of *radii, angles,* and *angles tangent* to *radii* on abrasive wheels—don't say an "angle tangent to radius dresser." Specify the KOPEC.

Write, wire or telephone

* * * *

Pictured above, the KOPEC with dust-shields unattached. In circle, key sliding-bar provides positive control of tangent travel.

S. J. KOPEC ENGINEERING COMPANY

17113 WEST McNICHOLS ROAD • DETROIT, U.S.A.

Mechanics Through the Ages

SOME OF THE METAL FOR REMINGTON RIFLES BEING MADE A CENTURY AGO, WAS DRUMMED-UP BY MEN WITH WAGONS WHO SCOURED THE COUNTRYSIDE AROUND ILION GORGE, N.Y. BUYING UP FROM FARMERS DISCARDED KETTLES, AXES, HATCHETS, PLOWS AND OTHER SCRAP. . .

THE LIMITED SUCCESS OF SAVERY'S PIONEER STEAM ENGINE CONSTRUCTED IN THE EARLY 1700'S WAS DUE LARGELY TO THE INABILITY OF THE SOFT SOLDER AT HIS DISPOSAL TO WITHSTAND BOILER HEAT OR PRESSURE AT THE SEAMS.

CHURCH CLOCK MECHANISMS WERE BEING TURNED OUT MORE THAN A CENTURY AGO BY BROWN & SHARPE OF PROVIDENCE, RHODE ISLAND.

DIAMETERS HELD TO SIZE

THROUGH 15 BEARING SUPPORTS

With This Cemented-Carbide Tipped

SHELL CORE DRILL

Special cemented-carbide tipped cutting tools produced by Carbide Fabricators have been given some of the toughest assignments in present day production . . . and they're doing the job!

Illustrated is a Carbide Fabricators shell core drill, 2⅛" in diameter, used for cam bearing holes in cylinder blocks. The holes are first rough drilled for the full length of the block which is 37¼" long.

Originally, steel cutters were used on this job, but extreme difficulty was encountered in holding the bearing holes to specified size. This was due to fast wear of the cutter blades, partially caused by the fact that little support is provided for the cutter during the operation. The bar which drives the core drill has a roller guide bushing back of the cutter which supports the cutter from one bearing to the next. There are fifteen bearings.

With the application of cemented-carbide to this job by Carbide Fabricators, large numbers of blocks are now completed—with diameters held to within .001"—without it being necessary to resharpen the tools.

In some of the cutting operations in your production, special cemented-carbide tipped tools will do the work faster . . . more accurately . . . cheaper. Upon receipt of your blueprints, Carbide Fabricators can provide you with full details—including prices—on the tools you're looking for.

Carbide Fabricators BERKLEY MICHIGAN

DIVISION OF MORSE TOOL COMPANY • DETROIT

Diameter	Area Sq. In.	Circumference	Weight In Pounds Per One Inch Of Length					
			Cast Iron	Wrought Iron & Steel	Common Yellow Brass 60% Copper	Bronze	Aluminum	Lead
1	0.7854	3.1416	.204	.220	.237	.251	.072	.322
1 1/8	1.2272	3.9270	.319	.344	.370	.392	.113	.504
1 1/4	1.7671	4.7124	.459	.497	.533	.565	.163	.725
1 3/8	2.4053	5.4978	.625	.677	.725	.768	.222	.987
2	3.1416	6.2832	.817	.885	.948	1.005	.291	1.291
2 1/8	3.9761	7.0686	1.034	1.118	1.195	1.268	.367	1.630
2 1/4	4.9087	7.8540	1.276	1.380	1.480	1.570	.454	2.016
2 3/8	5.9396	8.6393	1.544	1.672	1.790	1.895	.550	2.440
3	7.0686	9.4247	1.837	1.988	2.130	2.260	.654	2.900
3 1/8	8.2958	10.210	2.157	2.333	2.505	2.650	.767	3.400
3 1/4	9.6211	10.996	2.501	2.710	2.900	3.075	.890	3.950
3 3/8	11.045	11.781	2.871	3.105	3.330	3.530	1.022	4.530
4	12.566	12.566	3.267	3.548	3.800	4.020	1.163	5.170
4 1/8	14.186	13.352	3.688	4.000	4.280	4.540	1.314	5.830
4 1/4	15.904	14.137	4.135	4.470	4.790	5.090	1.471	6.540
4 3/8	17.721	14.923	4.607	4.980	5.350	5.670	1.640	7.280
5	19.635	15.708	5.105	5.530	5.930	6.290	1.820	8.080
5 1/8	21.648	16.493	5.628	6.080	6.540	6.925	2.000	8.900
5 1/4	23.758	17.279	6.177	6.680	7.160	7.570	2.200	9.760
5 3/8	25.967	18.064	6.751	7.310	7.840	8.300	2.400	10.650
6	28.274	18.850	7.351	7.960	8.530	9.040	2.615	11.600
6 1/8	30.680	19.635	7.977	8.640	9.270	9.820	2.844	12.600
6 1/4	33.183	20.420	8.627	9.340	10.000	10.611	3.070	13.600
6 3/8	35.785	21.206	9.304	10.067	10.792	11.444	3.315	14.700
7	38.485	21.991	10.000	10.820	11.600	12.300	3.560	15.800
7 1/8	41.282	22.776	10.733	11.613	12.400	13.150	3.820	16.900
7 1/4	44.179	23.562	11.486	12.450	13.330	14.140	4.080	18.150
7 3/8	47.173	24.347	12.265	13.260	14.200	15.070	4.360	19.350
8	50.265	25.133	13.069	14.120	15.150	16.058	4.650	20.600
8 1/8	53.456	25.918	13.898	15.020	16.130	17.100	4.950	21.950
8 1/2	56.745	26.703	14.754	15.960	17.130	18.300	5.250	23.300
8 3/8	60.132	27.489	15.634	16.900	18.100	19.200	5.570	24.700
9	63.617	28.274	16.540	17.900	19.200	20.350	5.880	26.150
9 1/8	67.201	29.060	17.472	18.900	20.300	21.500	6.220	27.600
9 1/2	70.882	29.845	18.429	19.930	21.350	22.650	6.550	29.100
9 3/8	74.662	30.630	19.412	21.000	22.500	23.850	6.910	30.700
10	78.540	31.416	20.420	22.100	23.630	25.100	7.270	32.250
10 1/8	82.516	32.201	21.454	23.250	24.900	26.400	7.630	33.600
10 1/2	86.590	32.987	22.513	24.350	26.100	27.700	8.000	35.600
10 3/8	90.763	33.772	23.598	25.550	27.400	29.000	8.400	37.350
11	95.033	34.557	24.708	26.750	28.650	30.400	8.780	39.000
11 1/8	99.402	35.343	25.845	27.950	29.950	31.800	9.200	40.800
11 1/2	103.87	36.128	27.006	29.250	31.350	33.200	9.620	42.700
11 3/8	108.43	36.914	28.192	30.540	32.700	34.700	10.000	44.600
12	113.10	37.699	29.406	31.850	34.150	36.200	10.470	46.500
12 1/8	117.86	38.484	30.644	33.150	35.500	37.700	10.900	48.500
12 1/2	122.72	39.270	31.907	34.500	37.050	39.300	11.350	50.500
12 3/8	127.68	40.055	33.197	35.950	38.500	40.800	11.800	52.500
13	132.73	40.841	34.510	37.350	40.000	42.450	12.276	54.500
13 1/8	137.89	41.626	35.851	38.800	41.600	44.100	12.750	56.700

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FOR TURRET LATHES

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ANY ENGINE LATHE CAN BE CONVERTED INTO A TURRET LATHE IN 15 SECONDS

Convert YOUR engine lathes into complete, accurate, precision turret lathes, by attaching the JEFFERSON TAIL STOCK TURRET, the JEFFERSON TOOL POST TURRET, and the JEFFERSON ADJUSTABLE PULL FEED to your lathes as shown below. The productive capacity of these machines will be more than doubled in many instances—because there will be available at all times NINE DIFFERENT TOOLS.

With these three JEFFERSON time-saving devices attached to a lathe, any kind of work may be done, such as forming, roughing, boring, finishing, knurling, drilling, tapping, etc., without stopping the lathe or changing tools. The JEFFERSON TURRETS are made very substantial, rigid, accurate and to fit small bench lathes up to lathes with 24" swing.

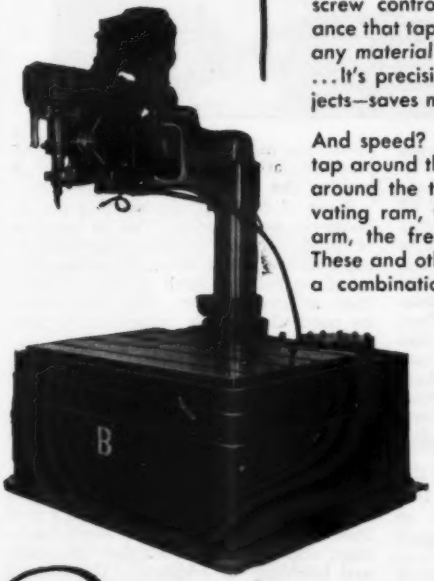
DELIVERY IN 15 DAYS

Write for further details, also literature on the Jefferson Motor-Driven Precision Milling Machine, Milling Machine Dividing Heads, Vises. Swing Frame Grinder, Endless Belt Sander, Foundry Riddle.

JEFFERSON MACHINE TOOL CO.
700 W. FOURTH ST., CINCINNATI, OHIO

DIAMETER	AREA SQ. IN.	CIRCUMFERENCE	WEIGHT IN POUNDS PER ONE INCH OF LENGTH					
			CAST IRON	WROUGHT IRON & STEEL	COMMON YELLOW BRASS 60% COPPER	BRONZE	ALUMINUM	LEAD
13 1/2	143.14	42.411	37.216	40.25	43.2	45.8	13.25	58.8
13 3/4	148.49	43.197	38.607	41.57	44.8	47.5	13.74	61.
14	153.94	43.982	40.024	43.3	46.4	49.3	14.23	63.2
14 1/4	159.48	44.768	41.465	44.8	48.	51.	14.74	65.5
14 1/2	165.13	45.553	42.934	46.4	49.8	52.8	15.28	67.8
14 3/4	170.87	46.338	44.426	48.	51.5	54.7	15.80	70.3
15	176.71	47.124	45.945	49.7	53.3	56.5	16.35	72.6
15 1/4	182.65	47.909	47.489	51.4	55.	58.5	16.90	75.
15 1/2	188.69	48.694	49.059	53.	56.9	60.3	17.45	77.5
15 3/4	194.83	49.480	50.655	54.7	58.7	62.3	17.98	80.
16	201.06	50.265	52.260	56.4	60.6	64.3	18.57	83.6
16 1/4	207.39	51.0509	53.8	58.2	62.5	66.2	19.14	85
16 1/2	213.82	51.8363	55.5	60.	64.5	68.3	19.75	87.7
16 3/4	220.35	52.6217	57.3	61.8	66.5	70.5	20.19	90.6
17	226.98	53.4071	59.0	63.8	68.5	72.6	21.	93.3
17 1/4	233.71	54.1925	61.5	66.5	71.4	75.7	21.9	97.3
17 1/2	240.53	54.9779	62.5	67.6	72.6	76.9	22.25	98.8
17 3/4	247.45	55.7633	64.3	69.5	74.7	79.1	22.9	100.
18	254.47	56.5487	66.2	71.6	76.8	81.4	23.55	104.5
18 1/4	261.59	57.3341	68.0	73.5	79.	83.7	24.2	107.5
18 1/2	268.80	58.1195	70.0	75.7	81.3	86.2	24.9	110.6
18 3/4	276.12	58.9049	71.7	77.5	83.3	88.3	25.5	113.4
19	283.53	59.6903	73.6	79.5	85.5	90.6	26.2	116.2
19 1/4	291.04	60.4757	75.6	81.7	87.8	93.	26.9	119.5
19 1/2	298.65	61.2611	77.7	84.	90.3	95.6	27.7	122.8
19 3/4	306.35	64.0465	79.5	86.	92.3	97.9	28.3	125.7
20	314.16	62.8319	81.5	88.2	94.5	101.	29.	128.8
20 1/4	322.06	63.6173	83.6	90.5	97.	103.5	29.75	132.
20 1/2	330.06	64.4026	85.7	92.7	99.6	106.3	30.5	135.5
20 3/4	338.16	65.1880	87.9	95.	101.7	109.	31.3	139.
21	346.36	65.9734	90.0	97.3	104.4	111.5	32.	142.
21 1/4	354.66	66.7588	92.0	99.5	106.7	114.	32.8	145.4
21 1/2	363.05	67.5442	94.3	102.	109.4	117.	33.5	149.
21 3/4	371.54	68.3296	96.6	104.4	112.	119.7	34.4	152.5
22	380.13	69.1150	98.8	106.7	114.7	122.5	35.2	156.5
22 1/4	388.82	69.9004	101.0	109	117.2	124.3	36.	159.5
22 1/2	397.61	70.6858	103.5	112	120.	127.4	36.8	163.5
22 3/4	406.49	71.4712	106	114.5	123	130.4	37.7	167.5
23	415.48	72.2566	108	116.7	125.3	133	38.5	170.7
23 1/4	424.56	73.0420	110.4	119.4	128.3	136	39.3	174.5
23 1/2	433.74	73.8274	112.7	121.5	130.7	138.5	40.	177.7
23 3/4	443.01	74.6128	115	124.	133.4	141.5	40.9	181.7
24	452.39	75.3982	117.5	127.	136.3	144.6	41.8	185.5
24 1/4	461.86	76.1836	120	129.7	139.3	147.7	42.7	189.7
24 1/2	471.44	76.9690	122.5	132.4	142.	150.7	43.6	193.5
24 3/4	481.11	77.7544	125	135.	145.	154.	44.5	197.5
25	490.87	78.5398	127.8	138.	148.	157.	45.5	202.
25 1/4	500.74	79.3252	130.2	140.5	151.	160.	46.3	206.5
25 1/2	510.71	80.1106	132.8	143.5	154.	163.	47.3	209.8
25 3/4	520.77	80.8960	135.5	146.5	157.	166.7	48.2	214.

COMBINE *Speed* WITH *Precision* IN TAPPING



THE new Bakewell Radial Tapping Machine, with its patented lead screw control, offers precision performance that taps Class 3 and 4 gauge fits in any material from plastics to alloy steels ... It's precision that eliminates costly rejects—saves more costly delays.

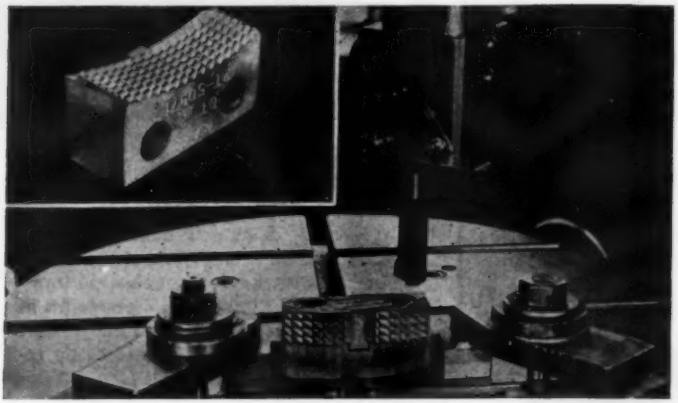
And speed? You gain it by bringing the tap around the work, instead of the work around the tap—from the hydraulic elevating ram, the rigid yet flexible radial arm, the free floating tapping head... These and other exclusive features assure a combination of speed and precision that will help you meet war production schedules ahead of time.

Also made in rigid spindle types No. 1 and 2. Capacities: 4-40 to 2 inches in steel.

Send for catalog

Bakewell MANUFACTURING COMPANY
2427 EAST FOURTEENTH ST. ★ LOS ANGELES, CALIF.

Eliminates Cumbersome Set-Ups



Intricately shaped teeth of chuck jaws can be cut using only one set-up with a slotting head attachment (Slotmaster) that is mounted on a round or flat-on-round overarm milling machine. The jaws are chucked on a rotating table on the milling machine . . . a slotting tool is ground to the shape required and inserted in the clapper box tool holder of the slotter. . . . When one row of teeth is completed — the work is indexed to the next position, and so on, until the teeth are finished. . . . Any other method would require several costly, cumbersome set-ups and even then it would be extremely difficult to maintain accuracy.

Illustration shows a close-up of the set-up and an insert of a chuck jaw made in this way.

(Photo—Courtesy Experimental Tool & Die Co., Detroit.)

Drill Jigs and Bushings

By John E. Hyler

One of the things that is of greater importance in these days than many suppose is the drill jig bushing, and the readiness with which highly suitable bushings may be obtained. Firms that make a specialty of supplying jig bushings, use a great deal of care in producing highly finished bores in their products, and that goes a long way in making the drilling jobs go smoothly.

Some of our drill jig bushing manufacturers are stressing the proposition of quick delivery in these days, knowing full well that when a sudden demand arises for such items, it is at least an even chance that they are to be used directly or indirectly in connection with the war effort.

Special bushings, which must be made up to order, naturally cannot be delivered so quickly as those of standard type. However, there are some bushing manufacturing concerns which handle a far wider selection of standard bushings than was formerly considered practical. One firm that I have in mind, in addition to having a full line of American Standards Ass'n bushings, also has a large number of standard bushings in addition. This allows the filling of many orders with dispatch, which would otherwise be delayed.

The frictionless, rotary type of drill and pilot bushing has proven very helpful in the handling of many jobs. These bushings, as made up by some firms, represent a worthy piece of work, being made sufficiently tight in their construction to exclude all dust

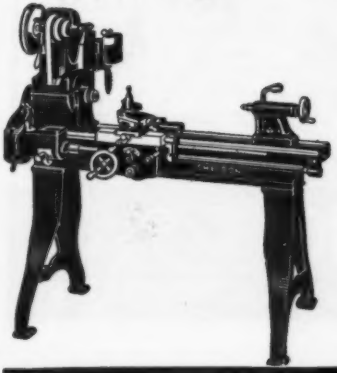
SHELDON Back Geared Screw Cutting PRECISION LATHES

For the Tool Room

● **The finest 10', 11' and 12' lathes ever built in the moderate price field. Large special analysis steel spindles *ground all over*, with extra collet capacity. Hand-scraped Bronze, Ultra-Precision Ball or Super-Precision Roller spindle bearings, (the finest bearings obtainable). Heavy braced, semi-steel beds with hand scraped ways (2 V-ways and 2 flat ways). These lathes come with a choice of aprons, gear boxes, and drives including the anti-friction, 4-speed, V-belt Lever-operated pedestal base motor drive illustrated. Telescopic Taper Attachment and other accessories available.**

For Production

● **Sheldon Lathes will stand up to any production work within their capacity—are ideal for second operation work. Production models available with any or all of these features: Ultra-Precision Ball or Super-Precision, Roller spindle bearings. Lever-operated Collet Attachment, Lever-operated Tail Stock, Lever-operated cross slide with double tool post, Lever-operated turret, etc.**



For Machine Shop

● **Both Bench and floor models with choice of Semi-quick or Full-quick Change Gears, Plain Aprons or Worm Feed Apron with Power Cross Feed. Overhead, Back or Underneath Motor Drives—Telescopic Taper Attachments, Tool Post Grinders, Milling attachments and all standard accesories.**

Write for Catalog and name of your local distributor.

SHELDON MACHINE CO., INC.

4242 N. Knox Ave., Chicago, U. S. A.

and dirt, yet free enough in rotation so they will never stick or cause trouble.

Another thing that is contributing heavily to the stepping up of production on various drilling jobs is the type of drill jig in which the work may be locked instantly and held by the mere throw of a convenient lever, and as quickly disengaged when the material has been drilled. The same jig body may be used for countless jobs, simply by providing a bushing plate to suit the job in hand.

One drill jig bushing manufacturer that uses special care in producing a highly finished bore in his product is Universal Engineering Co., Frankenmuth, Mich.

Bushing manufacturers who emphasize fast delivery on all orders are the Frederick M. Laserson Co., 6518 Avalon Blvd., Los Angeles, Cal., and Colonial Bushings, Inc., 145 Jos. Campau St., Detroit, Michigan.

A company having a far greater than ordinary list of standard bushings to facilitate rapid filling of orders is the Acme Industrial Co., 212 N. Laflin Street, Chicago.

Two firms which build and sell drill jigs of the lever-locking type described, are the Esco Engineering Corp., 4855 Fourth Ave., Detroit, Mich., and the Mohr Lino-Saw Co., 130 N. Union Ave., Chicago, Ill. Some very versatile drill jigs are also offered by Heuser Mfg. Co., 1638 N. Paulina St., Chicago.

Frictionless, rotary type drill and pilot bushings are made by the Giern & Anholtt Tool Co., 1312 Mt. Elliot Ave., Detroit, Mich.

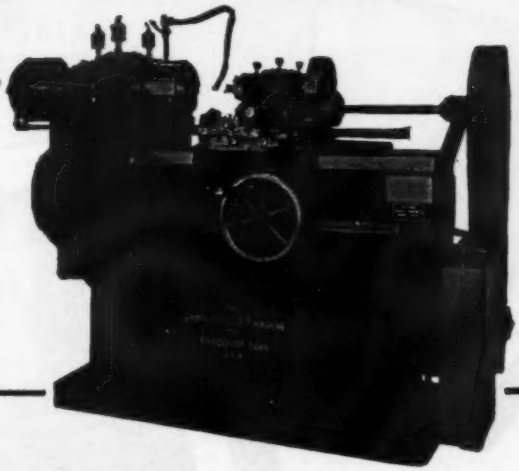
Heavy-Duty Non-Skid Clamp

A different type of C clamp with non-skid features has been designed. The clamp tip has a bronze bushing in which end of the screw rotates. The screw is made of heat-treated steel. This bushing is said to prevent galling and provides a free movement so that slippage on the work is prevented. Frame is of cast steel, also made with terminal lug for use in grounding cable during arc welding. A welded T-shaped wrench handle allows a firm grip. Details may be obtained from Patterson-Ballagh Corp., 1900 E. 65th St., Los Angeles, Cal.

"AND THE BOYS ARE JUST GETTING WARMED-UP!"

(Courtesy—Hobart Brothers Co., Troy, Ohio.)

Keep Ahead of DEFENSE DEMANDS *on the PRODUCTION of* EXTERNAL and INTERNAL THREADS



The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.

Send for Descriptive Bulletin giving full information.

The James **COULTER** *Machine Co.*

BRIDGEPORT • CONNECTICUT • U.S.A.

These attachments are designed for quick simplified setups for best results in tool room and are excellent for grinding gages, angles, slots recesses and surfaces which are either impossible to get at with a large wheel or require difficult and long, expensive setups in which small wheels are a necessity.

Designed for the most accurate service in grinding tools, gages, dies and mechanical equipment and having the widest imaginable variety of applications of which those shown above are but a few.

SEND FOR CIRCULAR GIVING FULL DETAILS.

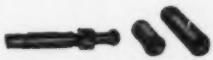
LIBERTY TOOL AND GAGE WORKS

235 GEORGIA AVE. PROVIDENCE, R. I.

Collet—.305" hole, hardened. Stock removed .002". Finish—2 to 3 micro-inches—tested on Brush Surface Analyzer for micro finish. Time saved by Sunnen Honing—35%.
—Fidelity Machine Company

SUNNEN HONING

provides a finish of 2 to 3 micro-inches —and at a saving of 35% in time!



Airplane Engine Parts accurately honed to a super-smooth finish.

8" Vickers Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.

Aircraft Valve Tappet Roller, 4-Micro finish.

"Produced an extremely accurate and glass-like finish."

Diesel Engine Fuel Injector Cylinder "So accurate that a piston can be fit within .00005 inch."

Accuracy — and a super-smooth finish with a real increase in production which means a saving in cost. That's the record of the Sunnen "MA" Precision Honing Machine in the modern plant of the Fidelity Machine Company.

This one example is indicative of the many reasons why hundreds of leading manufacturers handling important war contracts have adopted Sunnen Honing.

Consider These Advantages

Wide range — handles internal diameters of .185" to 2.400". Accuracy within "one-tenth" guaranteed — has been held to .000025" on production jobs. Relieves big internal grinders for other jobs. Corrects errors of out-of-roundness or taper caused by previous operations. Facilitates duplication of sizes. Does not require skilled labor. Practical — inexpensive — economical to operate.

Put Sunnen Honing to work in your plant!

SUNNEN PRODUCTS CO., 7935 Manchester Ave., St. Louis, Mo.

Canadian Factory, Chatham, Ontario

SUNNEN

Send for **FREE BULLETIN**

— Giving complete information. Or, if you prefer, a Sales Engineer will call and demonstrate this equipment in your plant, on your job.

WHICH OF THESE will fit your machines?

LUERS PATENTED

CUTTING-OFF BLADES

Now Adaptable on All These Leading Machines

You are consuming much longer time than you should to perform cutting-off operations unless you are using Luers Patented Cutting-Off Blades. That's another way of saying that Luers Blades will enable your machines to turn out more cut-offs in any given time.

If you employ any of the machines mentioned at the right for cutting-off operations, tell us which they are and we'll send you a Luers Blade and Holder of the proper size and style and let you try it in your own plant under your own conditions.

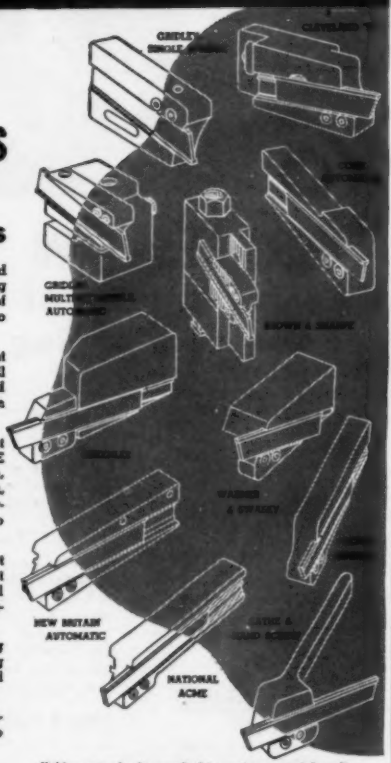
You'll find you'll have fewer breakdowns, less frequent regrinds, and practically no downtime—AND MORE PRODUCTION. Due to the unique design of the blade, which provides the necessary side and back clearances, excessive friction is eliminated. Furthermore, the hollow-ground top of the blade permits the bursting chip to leave the cut without excessive friction.

The patented double cam lock of the Luers Holder not only grips the blade with exceptional rigidity, but it enables the operator to release the blade simply and quickly for resharpening and resetting without disturbing set-up.

The advantage of these features, plus the time-saving feature represented in the design of the blade requiring only one face to be sharpened, points to the marked reductions possible in downtime.

Thus it is apparent that these blades have an exceptionally high producing factor that deserves your immediate consideration.

Luers Patented Cutting Off Blades and Holders are produced by Empire Tool Company under license issued by John Milton Luers Patents, Inc.



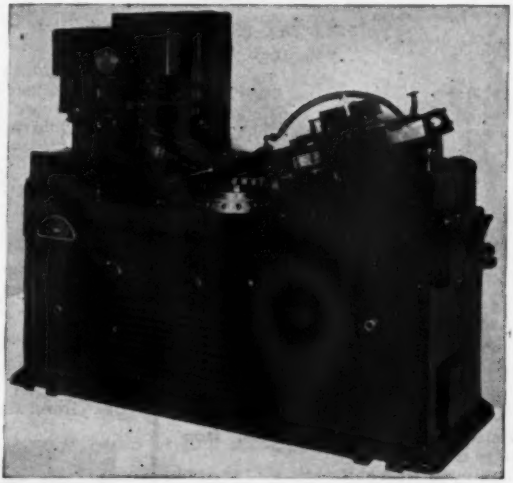
Holders can also be supplied to meet any special applications on any other machines not mentioned above.

EMPIRE Tool Co. 8782 GRINNELL AVE. • DETROIT, MICHIGAN

"Tooling Up" for

Snyder Special Hydraulic Drilling Machine

A PRODUCTION increase of 700% over what could normally be expected by customary tool-shop methods is claimed for this special hydraulic drilling machine which is used to drill oil holes diagonally thru the trunnions of a reduction gear carrier ring.



The machine consists of 3 main parts—the fixture table and index mechanism, and, the two, 2-spindle, hydraulically-operated drill units.

The index mechanism is a combination of hydraulic cylinders operating in conjunction with the Geneva index mechanism.

The constant velocity hydraulic cylinders, when actuating the Geneva index mechanism produce shockless rotation of the fixture table with smooth acceleration and deceleration.

The drill spindles are ball bearing mounted in a 2-spindle head and are equipped with bushing plates with overhanging guide pins.

The 2-spindle head is mounted in a hydraulically operated quill and is driven by an electroc motor on the inside of the base, thru v-belts and splined shafting.

In addition to other provision for maintaining accurate alignment of the small drills thru the bushing plates, a pair of rectangular guide bars also is employed.

The work cycle of the machine is semi-automatic. After loading, and manually clamping the workpiece, the cycle is started and the machine proceeds thru 20 indexes, completing the work.

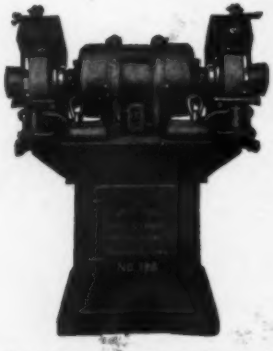
Electric control mechanism is mounted at left rear of machine and includes a tell-tale dial which shows at which part of the automatic cycle of 20 indexes the machine is operating.

In case of tool breakage, or if, an

BRIDGEPORT

Motor Driven Floor Grinders

ALTERNATING CURRENT
NOS. 184—186



Hardy, Rugged, throughout, from base to work rest.
Equipped with automatic starter having overload and undervoltage protection. Machine has push button control. Spindles accurately ground, and made of high carbon steel. Large sized ball bearings are mounted in heavy bell type end shields.

Write for folder giving full details.

BRIDGEPORT SAFETY EMERY WHEEL CO. INC.
1304 W. BROAD ST. BRIDGEPORT, CONN.

extremely dull tool is used, the machine will shut itself off automatically, this control being accomplished electrically thru limit switches mounted on each spindle. After replacing defective tool, operator can pick up the work cycle at the point where it was interrupted and let machine finish the part.

Coolant is self-contained and is brought thru the bushing plates to the drills by means of flexible connections.

The operation consists of drilling 40 holes, .078" diameter, 2 holes in each pass in the automatic indexing fixture which indexes 20 times. The holes are drilled to a certain depth and then redrilled to a greater depth. The drill finish is satisfactorily smooth.

The time cycle for the entire operation is given as 6 minutes, a production increase of 700% over the previous time cycle which was 44.5 minutes.

In addition, 2 other major economies are effected; automatic indexing greatly reduces handling, and the hydraulic tool feed gives uniform rate of feed and longer tool life, 1600 holes per drill, per grind being reported.

This special machine is designed and built by Snyder Tool & Engineering Co., 3400 E. Lafayette Ave., Detroit.

"Shell-Veyor"

To facilitate handling artillery shells in munition plants, Rapids - Standard Co., Grand Rapids, Mich., has developed

SPECIFICATIONS
10" swing; 24" between centers • Bed 6 15/16" wide by 43 1/8" long • Prismatic V and flat ways, hand scraped and honed • New Departure precision pre-loaded ball bearing headstock spindle • Thread cutting, 4-216 per inch • 25/32" hole through spindle. 1/2" collet capacity • 12 spindle speeds, 30 to 1450 revolutions per minute.
NO. 200 LOGAN FLOOR MODEL BACK GEARED SCREW CUTTING LATHE • ALSO FURNISHED IN BENCH MODEL NO. 210

A Logan Lathe is a "PLUS" Investment

Advanced streamline design and sturdy construction is your first impression of the No. 200 Logan Lathe. Further study presents convincing evidence of higher engineering standards, better workmanship and a wealth of added features — all of which will pay you extra dividends in continuous precision performance and better shop satisfaction.

LOGAN ENGINEERING COMPANY • Chicago, Illinois

Logan A NAME TO REMEMBER WHEN YOU THINK OF LATHES

HUNDREDS IN USE

—where Performance Counts!

FLEXIBLE SHAFT MACHINES

SIZES ¼ HP to 2 HP MOTOR

1 to 2 week deliveries (*on most models*)

These machines, known for their sturdy construction, enjoy wide use in many War Production plants; tested and approved by several engineering groups. Available in Bench, Overhead and Floor Models; Single or Multiple Speed.

NET PRICES

	SINGLE SPEED		*MULTIPLE SPEED*	
H.P.	FLOOR	BENCH	FLOOR	BENCH
1/4	$68.75	$60.50	$99.00	$93.50
1/3		77.00	110.00	104.50
1/2	115.50	110.00	137.50	127.00
3/4	137.50	121.00	159.50	
1	170.50		192.50	

LARGER SIZES MADE

Your inquiry will have our prompt attention!

ACME TOOL CO.
200 CHURCH ST.
NEW YORK

"Shell-Veyor," a portable belt-type conveyor with a 6" canvas belt that moves over a V-channel board assembled in a structural frame. Conveyor belt, powered by a 1/3 hp motor, passes over concave rollers at either end of frame. Assembly pictured measures 10' in overall length. Other sizes are available with motors of sufficient rating for continuous operation at speeds from 20 to 60 fpm to handle increased length of larger models. Frame is assembled on 2 adjustable stands to meet individual height and lift requirements. Model shown is RSV 10-6-1/3.

Medart 2 & 2 Universal

The Medart Co., Potomac and De Kalb Sts., St. Louis, announce an entirely new 2 & 2 Universal Bar and Tube Straightening Sizing and Polishing Machine. Lower cost, faster production and increased range of size and conditioning applications are claimed. It requires a minimum of floor space.

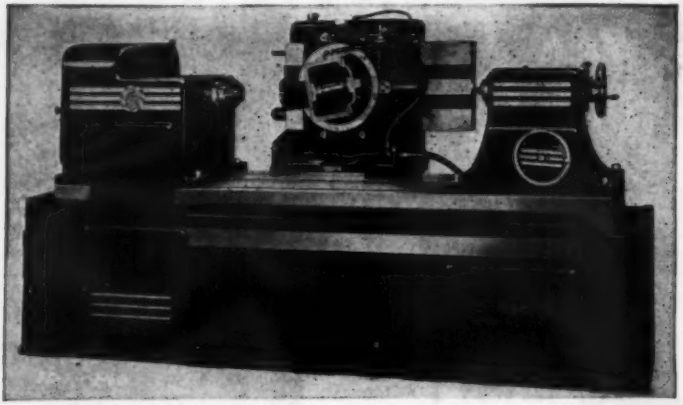
According to the makers, for the first time, output speeds of 50 to 1,000 fpm can be obtained—depending upon conditions involved and gear ratios specified for the 4-speed, built-in shifts. Each motor is mounted upon the same adjustable member which supports its driven roll. Thus, each roll with its supporting frame, its silent chain and gear drive and its motor all compose an integral unit which may be freely

ATTEND AMERICA'S WAR CONFERENCE ON METALS
THE TIME
October 13 to 16, Monday thru Friday
THE PLACE
Cleveland's Public Auditorium
THE EVENT
The National Metal Congress and War Production Edition National Metal Exposition
THE THEME
Increased Production Of War Products
• You've seen and shared in the rising production schedules of America's great metal industry. You've seen and helped this big industry "beat the promise" month after month in this war of metals.
You know that war has developed new products and new processes and new ideas — you've contributed your share. These aids to greater production will be discussed when the metal industry meets in Cleveland.
You are urged to attend this war conference on metals where your ideas and the developments of others can be made available to all, in contacts and conversations with men you know or should know. Meet with the four great technical societies in a hundred technical sessions. Consult with hundreds of manufacturers' experts in their educational displays, and with representatives of government — to speed production and win this war.
• Sponsored by the American Society for Metals, in cooperation with the American Welding Society, the Wire Association, and the Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers.
More than 200 manufacturers have already taken display space in this 100% educational meeting. 83% of all available space has been assigned. Companies serving the metal industry are urged to participate and put their technical experience and information on the war production line, where it will do the most good TODAY.
For display information, write
AMERICAN SOCIETY FOR METALS
7301 EUCLID AVENUE • CLEVELAND, OHIO

adjusted with relation to the opposing roll unit and guides. No universal joints or bevel gears are used.

The new 2 & 2 Universal is made in 4 sizes to accommodate every size of bar and tube from 1/16 to 6" in diameter and is sturdily built for continuous heavy duty.

Michigan Offers New Gear Shaver



Capable of handling gears up to 36" diameter, a new rotary gear shaver utilizing the crossed-axis principle of gear finishing is now being produced by the Michigan Tool Co., 7171 E. McNichols Rd., Detroit. The new shaver is similar in general design to the 865-48A announced recently and is designated as the 865-36A.

As on the larger machine, work is driven, the cutter in engagement with the gear "following" the gear. There are two driving spindles.

Three methods of finishing gears are available in the new machine. In the first, particularly suited to finishing of wide face gears, the cutter in addition to having an infeed toward gear is also reciprocated parallel to axis of gear.

This is accomplished by placing the slide which carries cutter head in a horizontal position. Cutter itself is mounted between idling centers on an axis at an angle to that of gear, when viewed from front of machine.

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S.—Inexpensive—last for years.

Write for Circular

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1859 Gardner Ave.
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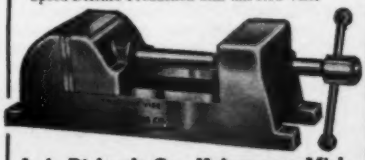
DOUBLE YOUR DRILL PRESS CAPACITY
Minutes are Seconds with the new TWISTITE Vise.
Opens to full capacity in one second.
Speed Defense Production with this New Vise.



J. A. Richards Co., Kalamazoo, Mich.

PRODUCTS

U. S. *Multi* MILLERS

SPECIFIED FOR MUNITIONS PRODUCTION

U. S. Multi Millers are specified for more than 200 separate operations on parts for a single aircraft engine . . they're applied for production of various parts of aircraft cannon . . . for rifle parts . . fuses . . small arms parts . . machine gun parts . . anti aircraft gun parts . . and numerous other munitions units. Typical set-up illustrations on this page show how effectively the U. S. Multi-Miller functions in war production; one inexperienced operator can handle a large battery of these versatile milling machines, easily maintaining the specified close tolerances so vital to interchangeability, U. S. Multi Millers are practicable for short lot jobs as well as long run jobs. All features are illustrated and described in Bulletin 60H . . *send for your copy today.*

Illustrated left to right: CONTOUR MILLING part for rifle—milling closed slot in receiver unit. STEP MILLING on fuse part—vertical head and quick operating cam vise for 2-level cut in single set up. CONTINUOUS MILLING form stock for gun and fuse parts. CUT-OFF of fuse parts from bar stock—automatically operated fixture and stock feed. Left: Full view of U. S. MULTI MILLER set up for index milling—hex or square milling of aircraft parts fully automatic. Cam-controlled action provides for high speed and accurate index milling—grinding—vertical milling—spur gear cutting—hand milling—automatic cut off—continuous milling of bar and coil stock—rotary milling—contour milling—climb milling—blind milling.

U. S. TOOL COMPANY, INC.

AMPERE, (EAST ORANGE), NEW JERSEY

SAVE
FLOORS....

DARNELL
CASTERS
& E-Z ROLL WHEELS

Write FOR THIS BOOK

DARNELL CORP. LTD.,
LONG BEACH, CALIFORNIA,
60 WALKER ST., NEW YORK, N. Y.
36 N. CLINTON, CHICAGO, ILL.

When machine is started, cutter head reciprocates laterally, sweeping cutter across face of gear. At end of each stroke, cutter carrying head is also fed slightly toward gear. When correct center distance has been reached, infeed stops and cutter reciprocates a few more times without infeed to provide desired finish on gear teeth.

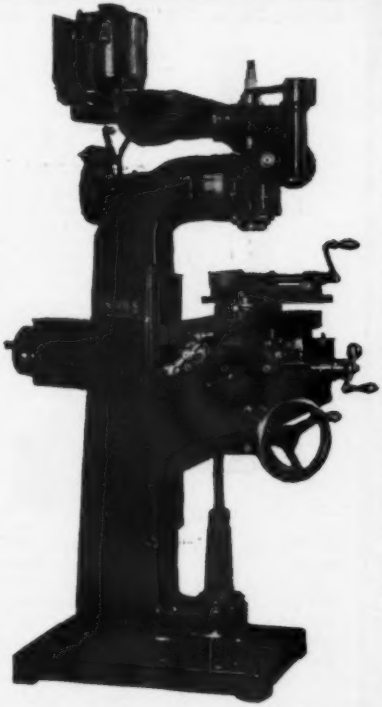
The amount of infeed per stroke, length of stroke, number of oscillations after reaching center distance, etc., are all separately controllable, controls being electrical. Gears up to 20" face width can be finished at any point within 48" from headstock, when mounted on shafts up to 72" in length between centers.

In the second method, used for quick finishing of gears having a narrower face width than cutter, the slide is set vertically, cutter however being in same relationship to gear as in first method. Infeed is not used, but cutter head is located so that axis of cutter and axis of gear, when viewed vertically, are at proper center distance from each other for correct depth of cut. In this method, gear is placed on machine out of mesh with cutter; cutter is brought into mesh and machine started. Cutter head moves down until it has passed maximum depth of cut and then returns to starting position and gear is finished. (Cutter may also start from bottom, move up and back down again if desired).

In this method, cutting action is due to the crossed axis relationship existing between gear and cutter, each of the serrations in cutter sweeping across face of teeth being cut while the two rotate in engagement. Speed of the single reciprocation of cutter head on cutter slide is set much slower than for multiple reciprocation employed in first method.

The third method represents a combination of first and second methods. Cutter slide is again vertical, but infeed is used, cutter head reciprocating vertically instead of horizontally, the gear being finished by a number of vertical "passes" instead of one as in the second method.

★ ★ INDEX MILLS ★ ★



Are attacking mountains of munitions parts with the ferocity of a mosquito boat after an enemy fleet. They are very versatile and are quickly adaptable to production work on the thousands of small precision parts now so vital to our Victory Program.

They do end mill work with end mills up to 5/8" in tool steel with amazing speed and accuracy.

Are equipped with verniers for locating holes and milled surfaces.

Have a spindle running in super precision preloaded ball bearings and guaranteed to give ordinary service for a year without any attention.

●

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BLANK AND BUXTON MACHINERY COMPANY

3100 E. Michigan Ave., Jackson, Michigan

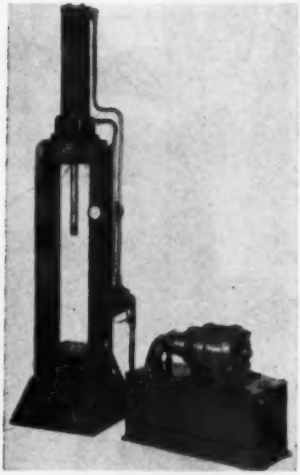
SERVING ARMY • NAVY • AIR FORCE • MERCHANT MARINE AND INDUSTRY
TUTHILL SMALL PUMPS
YOU CAN DEPEND ON
FOR BIG JOBS
Typical of Tuthill's complete line of dependable small pumps is the Model L series. Hundreds of thousands of these positive displacement internal-gear rotary pumps prove their superiority in action. Ideal for coolant, lubrication, fuel oil transfer, hydraulic mechanisms and oil burners.
Model L pumps are available in capacities from .33 g.p.m. to 3 g.p.m. and pressures up to 400 p.s.i. Built with leakproof Tuthill mechanical seal.
Model L pumps are obtainable for "ring" or "foot" mounting with various porting arrangements. Mounted on close-coupled motors, they require no base — save space, weight and labor.
Write for Tuthill Small Pump Catalog
TUTHILL PUMP COMPANY
941 EAST 95TH ST. CHICAGO, ILL.

In-feed may be any amount. Cycle is automatically terminated in first or third methods by a limit switch.

The 2d and 3d methods are both suitable for gears having a narrower face width than cutter. Gears may also be crowned in these two methods by using crowned cutters.

Hydraulic Press

A fully Hydraulic Press designed for a specific purpose in war industry but with broad industrial application is announced by Hydraulic Machinery, Inc., Detroit, Mich. Specifications are given



as: 25 ton pressure; 30" stroke; 60" of daylight; 4.4" per second (closing speed); .8" per second (high pressure speed); 5" per second (opening speed); 25" from floor to platen; 18"x18" platen; combination pump, relief, check and unloading valve; 7½ hp, 1200 rpm, 3ph, 60 cycle motor; manually operated control valve (controlling direction of ram); 0—300 lbs psi pressure gauge at head height; 2½"—8 thread on ram, 3¾" long. Construction is welded steel, mounted on flared base 30x30". Height overall is 139". Hydraulic power unit, shown adjacent to press, may also be remotely installed.

ZERO HOUR

THIS IS NO TIME TO WASTE TIME

R and L—the *time saving* turning tool is the answer. It will do the work of 14 different tools now being used in your shop.

It can be changed from right to left or left to right in 10 seconds. The only tool on the market of its kind.

No wasted time in set-up; performs many operations at once, such as: turning shoulder concentric with stock diameter; turning two diameters while drilling or reaming; turning one diameter-chamfering two corners, facing end of part along with drilling or reaming; turning and forming special shape or end of part while drilling or reaming; drilling and chamfering; pointing work concentric with turned diameter. *Write for detailed information.*

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PLUMB BOB

FOR PRECISION ALIGNING OPERATIONS
ARMAMENT AND JIG INSTALLATIONS

A feature of this Aero Tool Precision Plumb Bob is the threading of the upper part into the lower, three bearing surfaces between the parts hold them absolutely concentric. Rotating one part upon the other raises or lowers the indicating point more than ½" without losing concentricity. To assure a constantly sharp replaceable point, a watchmaker's pin chuck accommodates phonograph needles at the indicating point.

A new 1942-43 catalog is just off the press describing Aero Tool Precision Plumb Bobs and many other fine production tools for war industries. Please write for it on your firm letterhead.

AERO TOOL CO.

CUPFORGED AVIATION TOOLS

Aero Tool Co., 233 West Olive, Burbank, Calif.

Gas Gangrene

A new kind of gas gangrene threatens workers in America's war industries unless care is taken to guard open cuts and wounds from magnesium splinters and dust, it appears from a report by Dr. Carey P. McCord, of the medical department of Chrysler Corp., Detroit.

Metallic magnesium and some of its alloys, the newest widely used metal in war industries, have been found to produce a unique gaseous condition when they get into wounds. Unless the magnesium is properly and completely cleaned out of the wound, even trivial injuries may become serious and prolonged. The condition that results is similar to gas gangrene, a serious war-wound danger, except that it is caused by the magnesium instead of by germs. According to reports received, this kind of chemical gas gangrene has been very prevalent in German industries with as many as 5,000 cases in 1939.

Studies by Dr. McCord, Dr. Stuart F. Meek and Dr. Gordon C. Harrold, also of Chrysler Corporation, are believed to be the first in the United States showing the danger in not cleaning out all metal particles or dust from a wound in which magnesium particles might be involved. "Early in our investigation," Dr. McCord reported, "we found that rat wounds in which small particles of magnesium had been introduced, unlike those contaminated with most metals, glass and wood, promptly led to hydrogen gas formation in the tissues. The quantity of gas we found to be extensive and if neglected probably would produce a condition akin to a chemical gas gangrene. In the presence of magnesium particles, it was discovered that hydrogen was evolved from the fluids of the tissues themselves and if the metal was not im-

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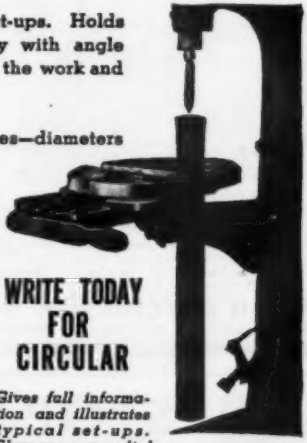
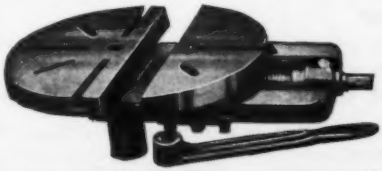
We will ship to rated concerns under this guarantee, on *free trial.* Should you decide not to keep the tool we will even pay return transportation

COMBINATION DRILL TABLE AND VISE

Simplifies the most difficult drill press set-ups. Holds work of all shapes securely. Does away with angle plates, clamps and supports. Just drop in the work and start to drill.

The Combination is made in various sizes—diameters from 8" to 27½", weighing from 27 to 600 lbs. Made of the finest materials, for long life. Easy to install. Specify the diameter of your shank in thousandths of an inch. We supply the drill table and vise with shank turned to size specified.





WRITE TODAY FOR CIRCULAR

Gives full information and illustrates typical set-ups. Shows use on radial drills. Complete specifications of all models including the square, all steel tables.

MODERN MACHINE TOOL CO.

Jackson, Michigan

mediately extracted, would form a gaseous tumor. Thus it would seem that injuries resulting from not cleaning all magnesium particles from wounds may be much more serious than ordinary industrial injuries. The danger of this effect of magnesium calls, in the first place, for special preventive procedure against accidental injuries where magnesium particles might be involved, and in the second place, the availability of immediate proper medical care. The complete removal of all metallic magnesium apparently is vital."

Industries Newest Tool . . .

MEAD BANDSANDER

It is a time, labor and money saver on innumerable jobs in any shop. Sharpens tools, cutters, etc., of many "kinds." F. O. B. Chicago, $14.95.

MEAD SPECIALTIES CO.

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Informative Diamond Pamphlet

The Diamond World, a pamphlet, published by Christensen Diamond Tool Co., 3683 E. Wallis, Detroit, Mich., gives interesting lights on industrial diamonds. Also given are details and specifications of the concern's new Brostite method of mechanically placing diamonds in tool holder in a single operation. The method is said to afford speed and accuracy, setting diamonds in the holding matrix in neutral, non-oxidizing atmosphere at lower consumer-costs.

Group-mounted tools, Series A, designed for large surface wheels and fine, uniform dressing for finishing or semi-finishing, contain 3 whole, natural diamonds, in a single line. In traversing the wheel, the 3 diamonds are so placed as always to be in contact. Group-Mount Series P contains one layer of whole, natural diamonds, unevenly spaced, so as to have two or more diamonds in contact with wheel at all times. Both series may be used for either roughing or finishing.

Cluster type dressing tools have 12, 15 or 18 specially selected whole diamonds precision-spaced in 3 layers, intended to be used continuously until all 3 layers are completely consumed.

Group Mount series is available for 4x12", 6x18" and 12x36" wheel sizes; Cluster types for wheel sizes 1x12", 3x18" and 12x36".

Pamphlet also gives an interesting map showing major and minor sources of industrial diamond supply thruout the world.

STOP DUST with DUSTKOP

DUSTKOP will collect dust from surface, tool and precision grinders . . . Compact, self-contained unit . . . Operated by ¼ hp continuous duty motor and fan . . . Easily renewable, spun glass filter cleans air . . . LOW IN PRICE . . . Immediate deliveries on high priorities.

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★ *Write for Bulletin A-500*

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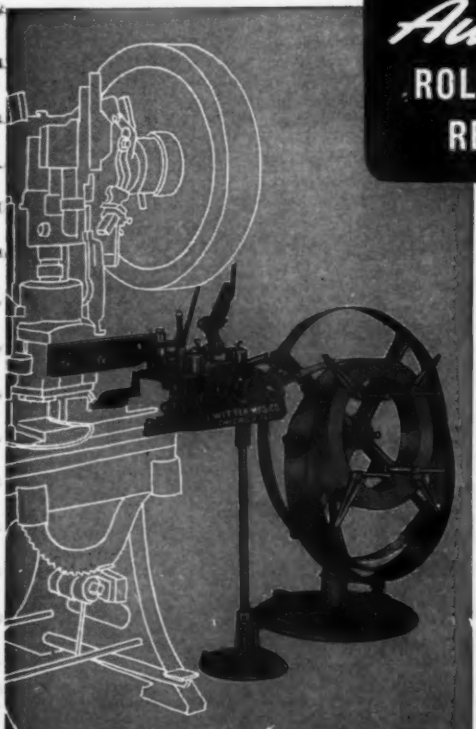
ACCURATE

WITTEK
Automatic
ROLL FEEDS AND
REEL STANDS



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★ Wittek Automatic Roll Feeds provide an improved and simplified method of punch press operation that insures rapid feeding under all conditions. Made in four different types to meet all automatic feeding requirements.

★ *Write for descriptive catalog.*

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NOW *One* MACHINE
for scores of milling operations

THE ARMOR MILL WITH HYDRAULIC FEED . . . Unprecedented range and extreme flexibility is achieved in the Armor Universal Turret by the combination of a horizontal spindle and a vertical spindle capable of any angle, mounted on single rigid turret, rotating a full 360°.

NO OTHER MACHINE HAS ALL THESE FEATURES

1. Hydraulic Feed
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9. 16" Longitudinal Travel
10. 8½" Cross Travel

Entire tolerances held to less than one thousandth.

ARMOR
UNIVERSAL TURRET MILL

AIRCRAFT MACHINERY CORPORATION
BURBANK • CALIFORNIA

Electron Microscope Data

Plastic films .00005" in thickness, equal to about the length of yellow-orange light waves, have been found best by General Electric scientists for revealing details of metal surfaces under the electron microscope. Such instruments magnify these details as much as 20,000 times, far greater than the useful limit of the ordinary optical microscope. These micrographs have already revealed important knowledge about metals for war material.

A full account of the technique by which these films are made and used is given in the July Journal of Applied Physics, by Vincent J. Schaefer and Dr. David Harker, of G-E Research Laboratory.

After the metal sample is polished and etched for a few seconds with acid, it is dipped into a dish containing a solution of Formvar, a plastic, in dioxane, a commercial solvent. The authors point out that it is necessary to do this within a few minutes after the sample has been etched and dried. Otherwise an infinitesimally thin film of grease or other contaminating material may start to form, affecting quality of the results.

After dipping in Formvar solution, the solvent evaporates, leaving the plastic film, which is then stripped off. It reproduces the microscopic hills and valleys of the metallic crystals, and can be placed in the electron microscope for examination.

Mr. Schaefer and Dr. Harker find that the exact thickness of the Formvar film is important, and this can be regulated by the strength of its solution in dioxane. Very thin films, about a millionth of an inch, do not show much contrast in the final electron picture. This seems to be because the film on both top and bottom follows

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SPECIFICALLY DESIGNED FOR INDUSTRIAL USE—

Precisely engineered to meet increased demand for dependable rectifiers ... In a range of 42 models—from 125 to 3000 watts capacity.

SIMPLE in operation. COMPACT—can be built directly into your equipment. Many other features.

With the NEW AUTOMATIC TIME DELAY SWITCH (in larger units) to protect rectifier tubes. A "money saver and production increaser—"prevents throwing the load on tubes until properly warmed up, etc.

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ELECTRO-MATIC PRODUCTS CO.

Makers: NEUTROL Electric-magnetic Chuck Control

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the hills and valleys of the metal. Thus it is all nearly equally transparent to the electron beam. If the film is as thick as .00250", contrast is also poor. Then the difference in the film between the hills and valleys is slight and all parts of the film offer nearly the same difficulty to passage of the electrons which take the place of light waves in the optical microscopes.

Best thickness is around .00005". These are just thick enough to make the top of film level, while bottom reproduces the hills and valleys. To the neglect of previous experimenters to appreciate these factors, the two G-E scientists attribute failure of others to obtain satisfactory electron micrographs by films stripped directly from metal specimens.

Facilitates Bearing Care

Developed by the Croft organization and distributed by Ahlberg Bearing Co., 3046 W. 47th St., Chicago, bearing maintenance for longer life is simplified by these production type units which wash bearings free from dirt and old lubricant and then repack the bearing full

of fresh, clean grease. It is easily portable. A sealed compartment prevents evaporation—loss of the solvent solution. Provision is made for a compressed air dryer to blow the bearings dry and clean, making the whole operation complete and easy in minimum time. Weighing only 10 pounds, it handles a full range of bearing sizes.

Second development is an additional unit for repacking cleaned bearings with fresh grease. With five pounds of clean lubricant in its base the bearing is simply placed on top of the unit and a lever forces the clean grease completely thru the bearing without waste or muss and without danger of dirt and contamination being carried in the lubricant.

MODEL No. 16 "SPECIAL"

CONSTRUCTED AS PER SPECIFICATIONS OF U. S. NAVAL AIRCRAFT FACTORIES

BUTTERFLY FILING and SAWING MACHINE

(Die Making Machine)

This is a very heavy, powerful machine and is designed for extra heavy filing and sawing, but it performs small work just as well. This type of machine is usually adopted in Ammunition Plants, Airplane Factories and machine shops where heavy and precision filing and sawing is desired. We also manufacture smaller models—Model D-10" Table; Model E.L. 12" Table.

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Time-Saving Production Vise

On your production jobs you can speed up milling and drilling operations tremendously with a Presto-Vise, because it has a sliding jaw which travels from "closed" to "open" at a single movement of a lever. Much faster than screw or cam-action vises.

Large jaw opening (4½") makes it easy to get the parts quickly in and out of vise. Jaw pressure can be adjusted to clamp any kind of metal without distortion. Once set, it stays set for the duration of the job—a great time-saving feature. Widely used in tool rooms as well as on production work.

With or without Jig Bushing Plate

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PRESTO-VISE

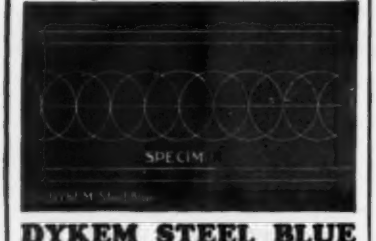
Lockformer Rolling Machine

Typical of what can be accomplished by modern rolling machines is the operation of the new Lockformer Model S10. It is said to shape metal strips in one operation, imparts radius, and accommodates 2 sizes. Flat strips of sheet metal, 20 gauge, are fed to rolls on either side of the forming head. The strips emerge from the forming head, in the design shown, in one operation (or one pass thru the machine).

Production is at the rate of 40′ per min., or approximately 600 pieces per hour. Rolls on right side of machine, (when viewed from operator's position) make a finished strip measuring 2⅜″ wide; rolls on left side produce a strip measuring 2″ wide. Both strips, in addition to having the shape shown in sketch, are also given a fixed longitudinal radius.

The strips produced, incidentally, are used as edges of revolving storage bin trays. This type of bin has the advantage of holding an exceptionally large variety of small parts in a minimum space and with maximum accessibility. It is used on shipboard and in other quarters where space is at a premium.

Further details of this and other rolling machines are available from Lockformer Co., 4613 Arthington St., Chicago.



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making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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THE DYKEM COMPANY

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(In Canada: 444 Pacific Ave., Toronto, Ont.)

Magnetic Book

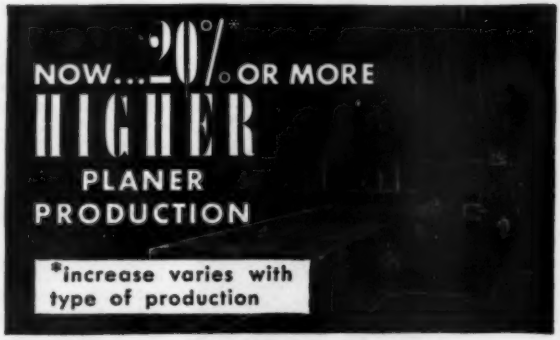
Magnetic Tools and Appliances in Engineering Production by E. Mollo has just been published by Chemical Publishing Co., 234 King St., Brooklyn N. Y. It contains 101 illustrations and 116 pages, and sells at $2.50.

It deals with the applications of magnetism in up-to-date engineering works, with such applications as magnetic chucks, magnetic clutches, lifting magnets, magnetic brakes, magnetic separators, and equipment designed for the magnetic detection of flaws in engineering materials.

Post-War

The skill and ability of American's tool engineers which have made possible the rapid conversion of industry to war production will, in peace time, bring to America mass-produced commercial planes and a new type of automobile with a much smaller and higher compression motor, Frank W. Curtis, Van Norman Machine Tool Co., past president of the ASTE, told members recently. Jigs, fixtures, dies and other forms of special equipment, products of tool engineering, are the measuring stick of success in modern industrial war production, instead of being merely the overhead evil they were formerly considered, Curtis declared.

The war effort, he said, has resulted in development of processes and products that otherwise might have been delayed. After the war, it will be another problem for tool engineers to make possible application of these discoveries for public consumption. Automobiles and airplanes are two outstanding products that will derive the benefit of scientific research creating a vast number of changes in our way of life. Just what automomtive engineers will do after the war is still a secret, but it is safe to assume that the industry will be reborn, as will many others. Increased capacity in production of alumium and magnesium, he added, will bring about tremendous expansion in use of light metals in automobiles. These metals will, no doubt, compete with steel for many purposes. Plastic materials will be available in larger quantities than ever, with automombile bodies of plastic design quite possible. Plastics capable of withstanding heavy blows are already available for many war uses



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Faster cuts—faster return! Westinghouse Variable Voltage Drives speed up nonproductive return strokes, give more cutting strokes per minute. ROTOTROL—versatile Westinghouse control—gives faster acceleration and deceleration, provides closely regulated d-c power, regardless of load, over entire speed range (40 to 1200 planer motor rpm). Table can be stopped and reversed at precise same point every time.

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VARIABLE VOLTAGE DRIVES

AMEs *Hundred Series*
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A COMPLETE NEW SERIES

These Dial Indicators have all the desirable features for measuring and checking accuracy. Four sizes to American Gage Design Committee specifications. Fourteen different dial numberings. One-piece, drop-forged cases and stems. Wire attached bezels. Cup-shaped dials that need no springs beneath. Pinions and staffs of hardened steel, ground for accurate fitting and long wear. Various styles of backs and contact points. The best and most effective shock-absorbing wheel assembly, optional.

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B. C. AMES CO.
WALTHAM, MASS.

and will find even more uses in peacetime.

Curtis said that a fuel many times more powerful than gasoline has been produced, demanding entirely new automobile engines of a very high compression type, small high speed and with greater power per pound of weight. These engines will probably be used in large numbers of small planes which he predicts will be produced after the war, bringing a new era of civilian flying. Thousands of army and navy trained pilots will want low-cost aircraft of their own. Mass production methods will carry over to peace-time, so that we may expect the air to rival the road as a means of travel.

Files and Rasps

A revision of Simplified Practice Recommendation R6-40, Files and Rasps, has been approved by the industry.

The revision lists 324 American pattern files and rasps, or 14% fewer sizes and styles than the 1940 edition. It omits 55 items which the Office of Production Management requested be discontinued for the duration.

The conclusion, for the first time, of important data on dimensions, cuts and tolerances, it is believed, will greatly enhance the efficacy of the simplification program. Heretofore the recommendation has listed only the standard lengths of each type of file and rasp. The proposed revision supplements this with detailed dimensional standards covering width, thickness, range of file teeth per inch, the number of rasp-teeth per row and rows per inch, and tolerances.

The scope of the recommendation has been enlarged to cover straight- and curved-tooth milled files, and detailed standards for this type are also included.

The revision will be identified as Simplified Practice Recommendation R6-42, Files and Rasps (American Pattern, and Straight- and Curved-tooth Milled Files), and will be effective from June 30, 1942. Mimeographed copies may be obtained free from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

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Size No.	Range of Bores Taken	Net Price
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3A	1¼" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00

TYPE B—STRAIGHT JAW DESIGN

Size No.	Range of Bores Taken	Net Price
1X	½" to 9/16"	$10.00
2X	9/16" to 21/32"	11.00
3X	21/32" to ¾"	12.00
00	¾" to ⅞"	14.00
0	⅞" to 1"	16.00
1	1" to 1¼"	18.00
2	1¼" to 1-9/16"	21.00
3	1-9/16" to 2"	29.00
4	2" to 2½"	40.00

ECONOMY TOOLS . . . for holding work while being machined between centers on lathes, grinders, millers, shapers, etc. Hardened tool steel, accurately ground. Sold singly or in sets. Write for bulletin.

All Sizes (Up to 7") in Stock for

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Busy factories need this "ZONE OF QUIET"

If factory noise interferes with telephoned orders, eliminate confusion by putting your shop phone in a Burgess Acousti-Booth. It's quiet inside for easy hearing.

Patented Acoustic Construction—Sound-absorbent walls of this booth soak up shop noise and make listening easy.

No Maintenance—This booth has no doors because it needs none. Hence, no mechanical parts to maintain. Easy to keep clean.

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Please send illustrated booklet describing the Burgess Doorless Acousti-Booth and how it works.

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BURGESS ACOUSTI-BOOTH

"The Inside of Arc Welding"

Six one-reel all-color sound motion pictures designed to help speed war efforts thru faster and better training of welding operators have been announced by C. I. MacGuffie, Manager of G-E arc-welding sales, Schenectady, N. Y., titled "The Inside of Arc Welding." The films are being produced by the Raphael G. Wolff Studios, Hollywood which have evolved a new technique for picturing this difficult subject in a dramatized and highly interesting manner.

The pictures are being made available to public, private, and industrial welding schools, as well as to other interested groups. The first of the pictures covers the fundamentals of arc welding, and has been completed. The other pictures will soon be made available and will deal with technique of arc control and electrode manipulation for all welding positions using both d-c and a-c equipment.

Because they show for the first time just what actually goes on inside the arc, these films are of great interest to the expert welder as well as the beginner. Thru the application of new methods of lighting, the all-color pictures show the electric arc in operation, revealing details of the arc and crater impossible to photograph previously.

Ingenious animated cartoons and actual welding shots are combined to add punch to the treatment of the subject. Featured in the cartoons is "Joe MaGee, the Welder," a timid but likable character created by Hollywood especially for the job.

"ALNOR" PYROMETERS

for every requirement.

Inexpensive, accurate, durable.

Write for catalog.

Illinois Testing Laboratories, Inc.
150 W. Hubbard St., Chicago

Subcontracts Successful

War production problems and consequent demand for greater placement of subcontracts, afford an interesting background to the remarkable results accomplished by small contractors on the production front. As a builder of U. S. Army tanks and nearly a hundred other wartime products, American Locomotive Co., New York, has consistently placed great reliance on smaller contractors. Results showed a marked increase, said the firm's President D. W. Fraser, writing in the Executives, Service Bulletin of Metropolitan Life Insurance Co.

A case in point, said Fraser, is the production - record on U. S. Army's M-3 medium tanks, the first produced by American industry. Award of contract to Alco was made Nov. 23, 1940. Some 200 machine tools were acquired, 2500 drawings processed, and more than 350 material orders placed. April 19, 1941, less than 5 months later, the first M-3 was delivered to the Army.

There was, of course, the "know-how" of engineering brains plus experience and the adaptability of many heavy-duty machine tools. But, of the several factors involved, said Fraser, subcontracting was of major and continued importance.

Placement of subcontracts he said is basically a question of whether or not a company is willing to use subcontracting to increase its production schedule when its own shop capacities are insufficient to meet these schedules. This is important for the reason that when schedules are based only on shop capacity, essential control is held over all phases of manufacture. If a company is willing—for the benefit of the war effort—to go heavily into subcontracting and thus increase schedules, the risk which the company assumes is far greater.

Nature of this risk varies with the type of products to be manufactured.

The Jackson No. 2 Verticle Milling Machine, ruggedly built of quality materials, will prove indispensable for Tool Room or Production applications. 5 speed V-belt drive, sturdy 4¼" quill and ¾" spindle capacity 8" x 32" table.

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The Standard of QUALITY

All standard sizes carried in stock for immediate delivery. Special cutters made to Blue Print.

As Cutter Specialists since 1919 we are able to offer the highest *quality* and *service* at *attractive prices.*

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QUALITY TOOL WORKS
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No Saw Welding Instant Internal Sawing

Unsurpassed in speed, efficiency and accuracy of sawing small and medium sized dies as well as miscellaneous parts.

THE TOOLMAKER'S BEST FRIEND

Write or wire for details and prices

GROB BROTHERS
GRAFTON WISCONSIN

Responsibilities encountered in subcontracting must be minimized by constant cooperation and teamwork between involved parties.

To attempt to control all of the necsary subcontractors yourself without an intermediate prime subcontractor involves a tremendous amount of follow-up and supervision, said Fraser.

"Mother Hen" System

To solve this problem, and to help the small industries, experience has shown it best to spread the work among prime subcontractors who, in turn, control the subcontractors.

American Locomotive has encouraged distribution of subcontracts. By doing this they have freed other capacities in their own shops to take on more of the other items and thus increase total output. As an example of experience gained and time saved, one of the outstanding subcontracted items is the tank suspension. Each of the suspension manufacturers, in turn, has given out a large number of subcontracts. American Locomotive has worked both with the prime subcontractor who furnishes the complete suspensions and with his subcontractors.

To effect complete utilization of America's productive capacities, it is doubly imperative that the practice of subcontracting be encouraged at this time. There are obstacles, but none of these is insurmountable. Cooperation and teamwork can accomplish production miracles—and this is a day when miracles are expected of each of us.

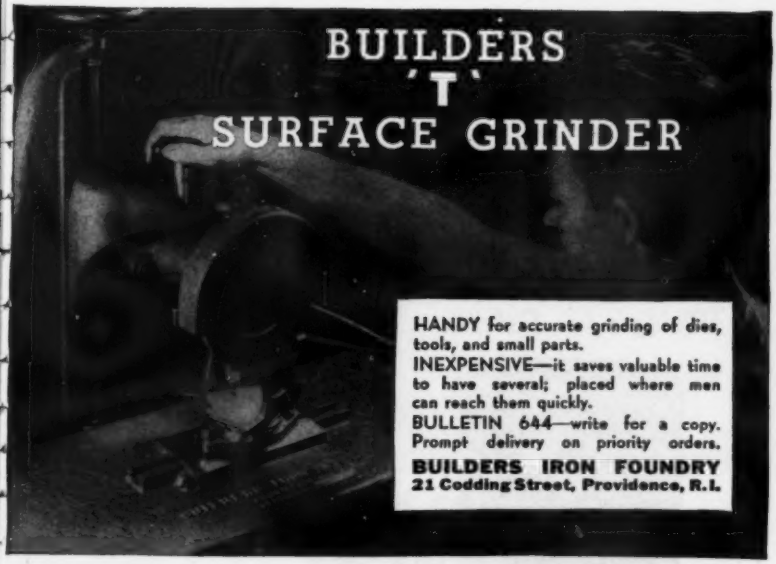
LESLIE HAND PUNCH PRESS
MOST CAPACITY
POSITIVE ALIGNMENT

Max. cap. 3/4" dia. hole thru 10 ga. iron, proper shear on punch, throat depth 6". Takes punch pressdies up to 3"x4½" in area. Leaf arm gives perfect alignment without ways or leader pins. Portable.

Ask your dealer, or write for circular

LESLIE WELDING CO.
2947 Carroll Ave. Chicago

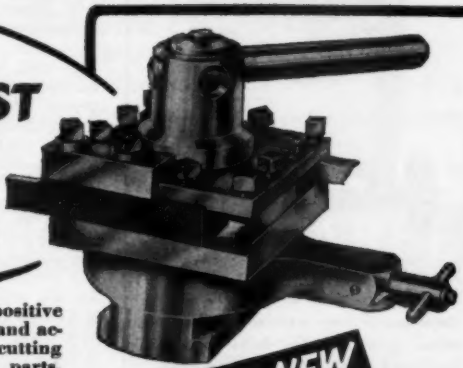
BUILDERS 'T' SURFACE GRINDER



HANDY for accurate grinding of dies, tools, and small parts.
INEXPENSIVE—it saves valuable time to have several; placed where men can reach them quickly.
BULLETIN 644—write for a copy. Prompt delivery on priority orders.

BUILDERS IRON FOUNDRY
21 Codding Street, Providence, R.I.

This **TOOL POST TURRET Will Pay For Itself Quickly**



Check these features—positive locking device—quickly and accurately indexed—has cutting off tool-hardened steel parts. To save time and money have a Colwell Turret on the job.

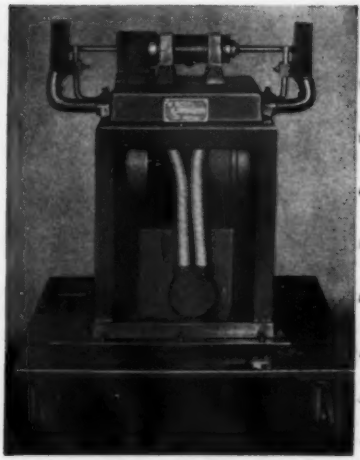
Send for new folder, gives sizes and specifications.

Send for NEW FOLDER

S. G. COLWELL 25 Congress Ave. Prov. R. I.

Dust Collector for Portable Grinders

The Dustkop dust collectors have been adopted as standard equipment on several special types of portable grinders built by Aget-Detroit Mfg. Co., 2046 Book Tower, Detroit, for an Eastern marine turbine builder. Requirement of the grinders—each of which has 2 grinding wheels driven at 15,000 rpm by a single motor under the table—is that they must be entirely



self-contained and also entirely self-exhausting as to the dust created by grinding of turbine blades.

Each unit has its own motor, fan and filter system complete. Can be transported anywhere without regard to existing dust collecting equipment. The unit, which is sufficiently compact to be mounted, as shown, under the motor which drives the shaft carrying the grinding wheels, pulls the dust-laden air away from the grinding wheels thru flexible metal hose into the unit itself. There it is sent thru a horizontally placed spun glass filter which stops the dust and lets it fall, permitting clean air to re-circulate into the room. Pan is readily removable for emptying at intervals as required by the amount of dust drawn from the grinding operation. To obtain maximum efficiency, intake hoods of the grinder units, which were designed and manufactured by Federal Engineering Co., Detroit, are supported so that they can be moved up or down as operating requirements indicate.

Welders for Defense

Any two Knock-Out welders can easily be connected in series to combine the amperage of both machines for occasional jobs requiring large capacity. Separated, they can be used on different jobs within their capacity.

Write or Wire for Bulletin W42-8H

K. O. LEE COMPANY
Aberdeen, South Dakota

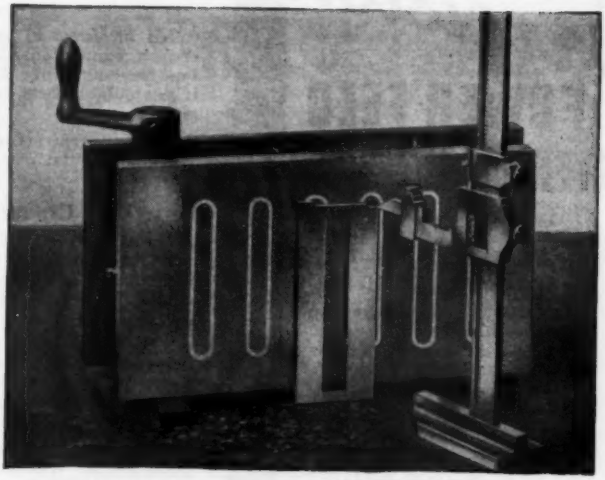
Buy U. S. War Savings Bonds and Stamps

Subcontracts

In doing its outstanding job contributing toward America's war effort, the huge automobile industry uses thousands of smaller companies as subcontractors. Even the biggest among the makers has never been entirely self-sufficient in providing itself with all of its needs. One passenger car maker depended on more than 1,000 outside companies for a list of 2,200 items, according to the Cleveland Plain Dealer. Another bought supplies from 8,000 firms at various times. So, too, today, these companies follow the policy of relying on smaller outfits for aid in meeting war production demands. When A.C. Spark Plug division of General Motors got its first armaments order, 43 firms were chosen to supply 67 of 330 needed parts. Of 471 parts needed by Oldsmobile in making 3 war products, 462 are farmed out to 151 subcontractors in 53 cities. Pontiac has sublet work on 175 out of 195 parts on an anti-aircraft gun, leaving only 20 of the most vital ones to be made by itself.

Packard has turned to 140 subcontractors to furnish parts for the aircraft engine it is building. Sixty of the firms are in Michigan. Others are scattered out in ten other states. One of the companies, Stewart-Warner, Chicago, has, in turn, 64 subcontractors of its own.

Allison Division of General Motors receives fabricated and semi-finished parts for aircraft engines from plants in 34 different cities. Chrysler has



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BROWN & SHARPE MAGNETIC CHUCKS

PERMANENT MAGNET TYPE

5 Sizes – Rectangular and Rotary Models

No Wires – No Heating – No Operating Costs

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BROWN & SHARPE MFG. CO., PROVIDENCE, R. I., U. S. A.

BROWN & SHARPE

A precision
POWER FEED
INTERNAL GRINDER

THE GRENBY IG-10
INTERNAL GRINDER

- Ex-Cell-O 35,000 RPM Spindle
- Power or Hand Feed
- Four Speed Power Feed Unit
- Precision Motorized Workhead
- Table Travel 10"
- Cross Travel 4"
- Grinding Capacity ⅛" to 3" Holes

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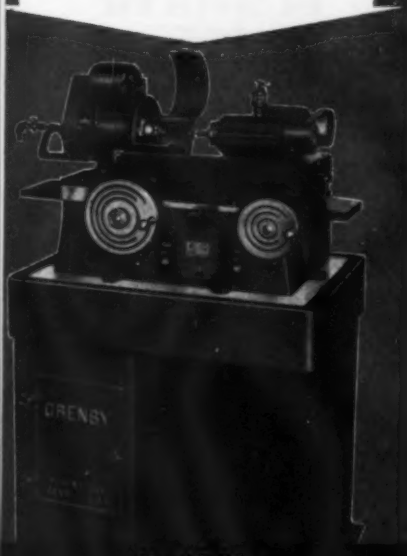


No. IG-10
GRENBY MFG. CO.
PLAINVILLE CONNECTICUT

called 700 firms to assist in production of its medium tanks. Continental Motors has more than 150 firms to which it has sublet parts for its aircraft engines.

Thus, subcontracting and subcontractors play a vital part in America's war effort.

Tool Production Data

The War Production Board announces that the value of new machine tools, presses and other metal working machinery shipped during May was $118,500,000.

Shipments of machine tools alone amounted to 25,700 units, with a total value of $107,300,000. During April, 25,400 units, valued at $103,364,000 were shipped.

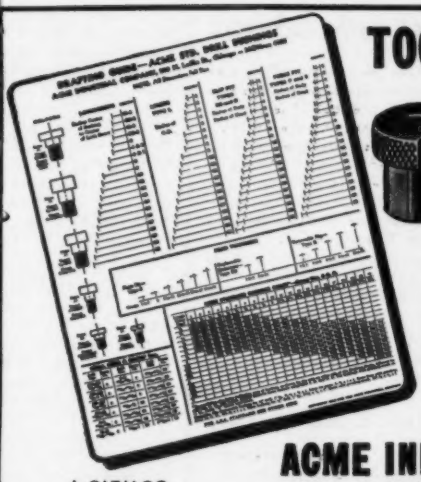
Production of metal working machinery has reached a rate of more than $1,400,000,000 a year and is steadily on the increase. Last year the value of metal working machinery was about $840,000,000 and the present going rate represents an increase of more than 65 percent.

Compared with the same month of last year, the May value for all metal working machinery represents an increase of 80 percent.

Vitamin-Mineral Tablets

Announcement of R-P Brand Vitamins and Minerals, a daily food ration for industrial workers, is made by Nutritional Research Products, Inc., 307 West 8th St., Los Angeles, Calif. The product is available in two types of tablets—one containing minimum daily requirements of vitamins and the other minimum daily requirements of minerals, as established by the Federal Food and Drug Administration.

A healthy worker is a more profitable employee than the half-well one who produces less, makes more costly mistakes and breaks the flow of production when absent due to sickness. To the plant manager, for that reason, vitamins are a new, powerful factor in industrial relations and production increase.



TOOL DESIGNERS..

Get this DRAFTING GUIDE for JIG BUSHINGS !

★ Accurate (full size) drawings of drill jig bushings can be made *faster* when the Acme Drafting Guide is used. Dimensions are shown graphically and can be picked up directly from the guide with compass or divider . . . no cutouts to give inaccurate tracings. Shows all necessary symbols and specifications for ordering. The Acme Drafting Guide is conveniently sized (8¼"x10") printed in green and red to show the A.S.A. and Acme Standards respectively. Write for a copy of this valuable timesaver today . . . it's yours for the asking!

A CATALOG IN A NUTSHELL

ACME INDUSTRIAL CO.

Makers of Standardized Jig and Fixture Bushings
210 N. Laflin St. MONroe 4122 Chicago, Ill.

ACME

JOIN THE SAVE YOUR TAPS MOVEMENT

THEY'RE NEEDED TO HELP BUILD MORE PLANES TO WIN THE WAR

ALCO
Tap Holder

Causes of tap breakage, well known to those familiar with drill and tap operations, may be improper feed or tap angles, incorrect alignment of work spindle, turret hole, tap bushing or holder.

ALCO TAP HOLDERS cannot correct improper feed angles nor misalignment of work spindle, but they CAN and DO afford exact tap angle, absolute concentricity on every tapping operation, and they very definitely eliminate the use of bushings. Use the tap holder that stops tap breakage and gives longer life to your taps.

ORDER ALCO TAP HOLDERS NOW

One of the family of Alco tool holders for every drilling, tapping, reaming and thread cutting operation.

ALCO EFFICIENT TOOLS *WRITE FOR CATALOG*

THE ALCO TOOL COMPANY
835 HOUSATONIC AVE. BRIDGEPORT, CONN.
DETROIT OFFICE — 908 STEPHENSON BLDG.

Eliminates Costly Hobbing

CASE HISTORY Number 5

An internal gear had to be cut in the bottom of a cavity in a block of steel. After the preliminary machining operations had been performed, the block was chucked on a dividing head mounted on the table of a milling machine. . . . A special form tool and tool holder was inserted in the clapper-box of the "SLOTMASTER" . . . . With this set-up the job was done quickly, cleanly and accurately eliminating several costly hobbing and head operations.

SLOTMASTER can be used on milling machines and provides double duty facilities at a minimum cost. It requires but little time to change-over from one head to the other . . The stroke of the ram is adjustable from 0 to 4¹ .. the speeds range from 50 to 250 s.p.m. The tool holder of the clapper box type, can be turned in any position .. All of the working parts are of tool steel heat treated and ground to close tolerances . . SLOTMASTER comes complete with pulleys, motor, belt and mounting adaptable to round over-arm or flat-on-round-overarm milling machines.

Send for 4-page catalog and give the specifications of the milling machines that you wish to equip. Immediate deliveries on high priorities.

EXPERIMENTAL TOOL & DIE COMPANY

12607 Greiner
Detroit, Mich.

Conventional set - up on round over - arm milling machine.

Hydraulic Accumulators

Storage of hydraulic power or pressure always involves use of some auxiliary, compressible medium, since fluid itself cannot be compressed. It is interesting to note what has been done along this line by engineers, as to the selection of such media. Compressed air has been extensively used for this purpose, the air being forced into smaller space by the action of the hydraulic fluid. However, air is to some extent absorbed by water, and a pump is necessary to replenish the air supply from time to time to maintain an adequate supply. Compressed air ballasted accumulators are recommended by some of our foremost hydraulic engineers.

In one case that came to attention, an engineering firm was making some progress in adapting so-called gas bottles, containing a compressible gas, to hydraulic accumulator duty. The gas, it was claimed, was not absorbed by the water of the system. It is not known whether this method obtained a very large place in practice.

Hydraulic chucking and work-holding devices are of particular interest to the machine operator. One of the outstanding makers of such equipment, using oil as the hydraulic fluid, has a spring-actuated accumulator. Oil under presure is delivered to this accumulator, and a pressure regulating valve operates to throw out a switch which stops the motor driving the geared oil pump. When enough of the stored hydraulic pressure has been used by lathe chucks or other hydraulic units in operation, the pressure regulating valve cuts the switch in again and starts the motor. This saves power lost in some systems thru the by-passing method.

Again and again we raise our sights and still exceed our quotas.

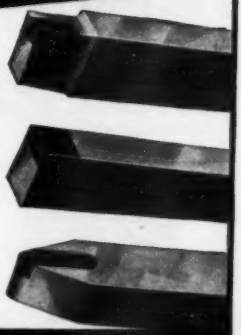
SPECIAL BOLTS, NUTS and STUDS
DIE SINKING and DROP FORGINGS
SCREW MACHINE PRODUCTS • HEAT TREATING
SPRAYED METAL EQUIPMENT

Estimates gladly submitted. Send samples or blueprints. Catalog on request.

RHODE ISLAND TOOL CO.
148 West River St., Providence, Rhode Island
Serving American Industry Since 1834

RITCO

USE WILLEY'S GENERAL PURPOSE TUNGSTEN CARBIDE TOOLS!



Ready to ship, standard tools, handle 90% of most requirements. Tipped with Willey's Metal, they are suitable for machining cast-iron, tough hard rubber, bakelite, fibre and tough alloy steel steels.

Prompt delivery eliminates down time, increasing production and lowering costs. Low prices mean added economy. Special tools quoted on request.

WRITE FOR BULLETIN 142

Prices and full information on all grades, sizes and classifications of Willey's standard tungsten carbide cutting tools and blanks.

WILLEY'S CARBIDE TOOL CO.
1340 W. Vernor Highway, Detroit, Michigan

EDITORIAL NOTES:—

Compressed air ballasted hydraulic accumulators have been supplied and recommended quite highly by Charles F. Elmes Engineering Works, 222 North Morgan St., Chicago, Ill.

Files reveal that about ten years ago, engineers of the Baldwin-Southwark Corp., were studying the application of gas bottles to hydraulic accumulator duty, and that they had developed a suitable system of controls for use in connection therewith.

The Logansport Machine Co., which has developed so many splendid hydraulically operated devices for chucking and work-holding, developed the spring-actuated pressure accumulator as described and use it in connection with many of their installations.

Synchronous Motor Booklet

A new 4-page booklet describes the "HG" synchronous motor for coupled, belted and geared service.

The booklet lists operating characteristics of the motor and stresses distinctive features, construction and application. Seven illustrations show the various parts of the motor and each is described in detail.

These "HG" motors are recommended for all types of constant speed machinery such as fans, blowers, compressors, pumps, rubber mill lines, motor generator sets, etc. They afford a very economical means of improving power factor and thereby reducing power cost. Motors are normally finished for 100 per cent or 80 per cent leading power factor operation. However, they can be designed with lower leading power factors where additional power factor correction is desired.

A copy of leaflet L-20653 may be obtained from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Machine Tool Motorizing

An outstanding feature of the Drive-All illustrated catalog is the full treatment of a simplified technique of mounting individual motorizing units with standardized brackets on any type of machine tool.

This new publication points out the definite advantages of individual motorizing of belt driven machines from standpoints of economy, production increase, shop flexibility and appearance and improved working conditions. Such information should prove doubly helpful today when businesses, large and small, are being urged to equip themselves to take care of work essential to the war program. It is known that there are many hundreds of older machine tools in the country that only need such modernizing to step them up to the pace of modern production. It's a practical, informative catalog with the kind of application pictures and engineering data that shop men find useful. The publication is available directly from Drive-All Mfg. Co., 3400 Conner Ave., at Detroit or from the company's representatives.

Drill Jig Bushing Book

In a markedly thoro and conveniently-arranged data and specification booklet, Bulletin 11882, Ex-Cell-O Drill Jig Bushings are detailed by Ex-Cell-O Corp., 1188 Oakman Boulevard, Detroit Mich. Both covers and inside pages are of heavy board paper, that will withstand oil, grease and hard usage. Ordering, pricing and specification are greatly facilitated in the new issue.

Fast — Quiet — Speed Changes!

Speed changes are made without removing tool from cut with Remco Drives installed. Less down-time. More out-put. No tool marks. Motor takes hold gradually by slipping belt—simple friction-clutch action. Drive has rigid, three point suspension instead of ordinary one or two points. Easily installed, at very low cost. Inquire! Remco Products Corp., State and Hay Sts., York, Penna.

REMCO MOTOR DRIVES

for LATHES, SHAPERS, DRILLS, MILLING MACHINES, etc.

GRAHAM MULTI-PURPOSE VISE

Time is short—this vise saves it! By means of special attachments and jaws, it meets a vast variety of repeat-operation and special holding needs that would otherwise require jigs. As a plain vise, its flush, square and parallel accuracy make it ideal for general work on miller, drill press, radial, planer, shaper, grinder.

KNURL HOLDER FITTING LATHE TURRET

Using only a pair of straight-cut knurls, this tool can be adjusted to cut straight, spiral or checkered patterns of endless variety. Can pass over stock of larger diameter than knurled section. Shank made to fit your turret.

Illustrated price circulars upon request

GRAHAM MFG. CO.
61 BRIDGE ST. EAST GREENWICH, R. I.

Geared For Victory

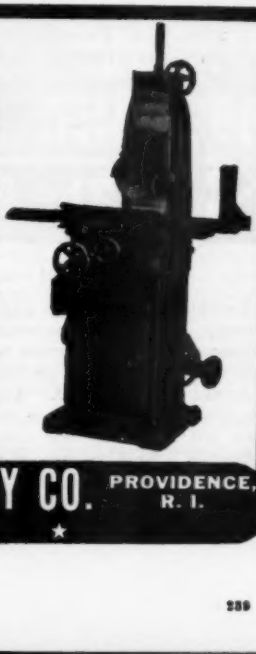
Gear Specialists

- SPUR
- WORM
- BEVEL
- HELICAL

The Taylor Machine Co.
1917 EAST 61st ST.,
CLEVELAND,
OHIO

"TAYLOR-MADE"

REID AUTOMATIC FEED SURFACE GRINDER



The No. 2A Surface Grinder will grind work 18" long, 6" wide and 11½" high, using a wheel 7" in diameter.

High-grade, heat treated Chrome Molybdenum steel spindles, hardened and ground.

Work table 46" long, 8" wide, with a working surface 18" by 6" and three T slots; Table travel is automatic in both directions.

Machine requires a 1½ H. P., 1800 R. P. M. motor which is entirely enclosed in base.

GOOD DELIVERIES IF PRIORITY IS ATTACHED TO ORDER.

Write to Dept. A for Circular
Exclusive Selling Agents.

387 CHARLES STREET **H. LEACH MACHINERY CO.** PROVIDENCE, R. I.

Some
OLD CUSTOMS
ARE GRAND!

That Saturday night scrubbing in the old tub was a grand old custom . . before the days of modern tubs and showers!

Against the hazards of INDUSTRIAL DERMATITIS, some plants stick to old-fashioned customs . . . . like the use of antiseptic oils in cutting compounds. Modern science has shown that they can't do the job COMPLETELY!

PLY Liquids and Creams—with a specific formula for each type of hazard—have proved their worth in the nation's leading industries. Pre-work application to the hands prevents irritation and often serious infection. PLY is harmless, easy-to-use, economical.

• Write TODAY for latest FREE BOOKLET "The Answer to Industrial Dermatitis"

PIONEERS OF SKIN PROTECTION IN INDUSTRY

PLY

The MILBURN Co.

Detroit • Michigan

Accuracy!

A relative term is this matter of accuracy. We must know what you are talking about in connection with it before we get any exact picture of what is meant by the word. Accuracy on the most particular piece of shafting does not approach the accuracy required in a ball bearing, and accuracy as applied to ball bearings still will not do when making gage blocks. We all need considerable education with reference to the implications of this word and how far to go with it in any given instance.

Accuracy is one of those things which tend to "pile up" in the demands made, when specifications pass thru the hands of 2 or 3 different men in authority before work is finally executed. This is a thing that has been noted again and again. Smith, of the So-So Company, is having a lot of pieces turned on contract by another firm. They are not so particular; he figures plus or minus .020" is close enough, but he is afraid of the other firm's standards of accuracy, so he sends along the specifications. "These must be pretty accurate, hold to plus or minus .010". The production department chief of the firm contracting the work scratches his head and says to himself "If these have to be accurate, I'd better hold the shop a little closer than the tolerance he gave." So he scribbles on the shop order. "Hold to plus or minus .008."

That worries the machine shop foreman a bit. so he says to his lathe operator, "Now listen, buddy. These things have to be right. Plus or minus .005" on these." Thus is production unnecessarily slowed on a great many different items.

Buy United States War Savings Bonds and Stamps

HOPPERS

THE FASTEST FEEDING HOPPER EVER DESIGNED

SCREWS AND SCREW BLANKS UP TO 500 PER MINUTE
NUTS UP TO 600 PER MINUTE
RIVETS UP TO 300 PER MINUTE
BULLET CORES (50 CAL.) 150 PER MINUTE
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PLAIN WASHERS UP TO 1000 PER MINUTE
PINS (PLAIN) UP TO 1000 PER MINUTE

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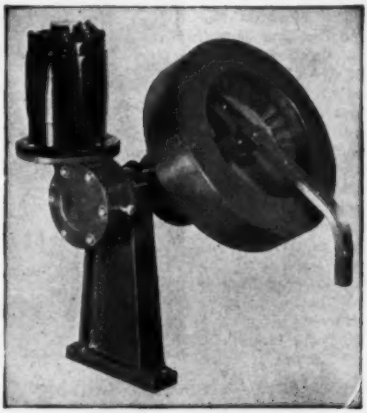
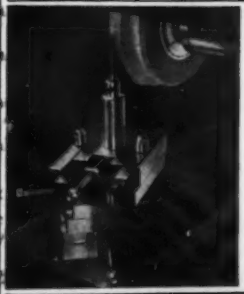


DETROIT POWER SCREWDRIVER CO.
2809 W. FORT ST., DETROIT, MICH.

THE *Robertson* COMPOUND ANGLE WHEEL DRESSER



saves precious man-hours in production . . . .

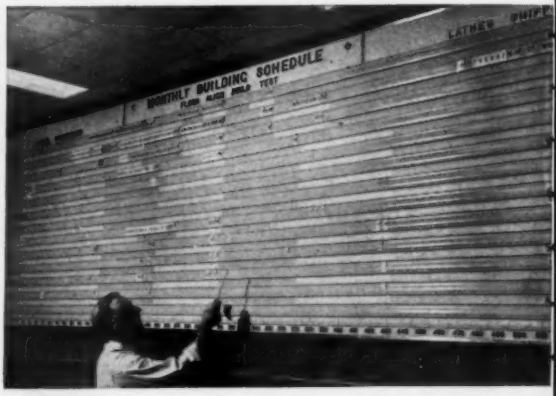
This precision instrument is playing a vital, important part in America's all-out war effort . . . speeding-up production, by saving both time and money.

With the Robertson Compound-angle Wheel Dresser, a machine operator can dress an included angle tangent-to-radius from 0° up to and including 180° at one setting, thus eliminating the old method of "trial and error" dressing.

Write TODAY for illustrated descriptive folder.

F·H·ROBERTSON CO.
420 BROADWAY - MALDEN, MASS.

Most important in the minds of everyone at The Monarch Machine Tool Co., Sidney, Ohio, is "LET'S WIN THIS WAR." The success of their war effort is keenly watched and carefully measured day by day on this scheduling board, constructed of colorful plastics, and erected along one wall of the office of P. A. Abe, Vice President of Engineering and Production. The figures show machine tools scheduled, built, tested and shipped.



New Homo Tempering Catalog

Expediting work thru the heat treat with highly uniform results and with rejects minimized, is interestingly set forth in the newly revised Homo Tempering Catalog, T-625, just issued by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa. There are many new pictures showing just how the method is used to step up heat treating operations, as well as interesting imformative data and charts.

DROP FORGED CLAMPS

Extra Strong—Longer Life

Products Engineering Company's quick acting jig clamps are the only drop forged clamps available—they're stronger—have exceptional opening and closing speed and a positive lock impervious to pressure and vibrations—it pays to specify them. Available in many models and sizes from midget to 6" clamping bars. Send today for file size catalog.

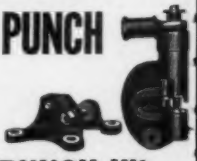
PRODUCTS ENGINEERING CO.
700 E. FLORENCE AVE., LOS ANGELES, CALIF.

BUY WHITNEY-JENSEN
METAL-WORKING MACHINERY and HAND TOOLS
for LONG LIFE and ACCURACY

NO. 20 BALL BEARING

Powerful action gives tremendous punching power in a light-weight tool. Capacity ½" hole in ½" iron.

PUNCH



No. 5 Jr. PUNCH Kit

Useful! Handy! New improvements. Seven punches and dies in metal kit box. Capacity ¼" hole in 16 ga. iron.

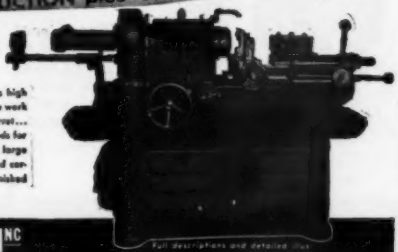
Write for Catalog

WHITNEY METAL TOOL COMPANY
115 FORBES STREET • ROCKFORD, ILLINOIS

The MOREY 2G
Back-Geared
TURRET LATHE
Timken Bearing
Self-Locking Turret—Infinite Spindle Speeds

CAPACITY
Automatic Chuck (round) 1"
Swing over cross slide 6"
Swing over bed 14"

Features HIGH SPEED PRODUCTION plus OPERATING ECONOMY



The MOREY 2G Timken Bearing Turret Lathe insures today's high speed production with a minimum of operating expense. More work at less cost with these money saving features: Self-Locking Turret... Vibrationless precision with an infinite variety of spindle speeds for every job . . . Back Gears instantly thrown in through extra large Twin Disc Clutch . . . takes full advantage of high speed and carbide tools. Modern design for modern production. Can be furnished with tooling.

Full descriptions and detailed illustrations are shown in Circular 629. Ask for it TODAY.

MOREY MACHINERY CO., INC
410 BROOME STREET • NEW YORK N. Y.

THE NEW PORTMAN
ROTARY SURFACE GRINDER

COMBINES PRODUCTION SPEED, POWER, CAPACITY, FINE FINISH AND ACCURACY. SIMPLIFIED CONTROLS ENABLE INEXPERIENCED OPERATORS TO PRODUCE PRECISION WORK FAST.

•

GOOD DELIVERIES

PORTMAN MACHINE TOOL CO.
MOUNT VERNON NEW YORK

Almond Drill Chuck

The Original Manufacturers of Drill Chucks!

The Almond Three-Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of Drill Chucks. For over Seventy Years Almond Chucks have formed a necessary part in the logical procedure of Machine Developments. Are made in types and sizes to fit all Machine Tools and Portable Drills.

Write for further information.

T. R. ALMOND MANUFACTURING COMPANY

WRITE FOR FOLDER **ASHBURNHAM, MASS., U.S.A.**

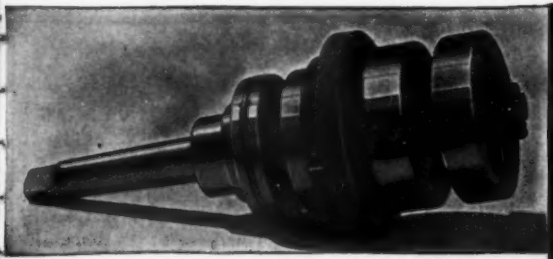
Deepfreeze Santocel Industrial Unit

Important to industry is development of the new Deepfreeze Santocel extreme low temperature metal chiller, manufactured by Motor Products Corp., North Chicago, Ill.

Deepfreeze is offered in 2 sizes, known as the "Santocel" cycles from minus 40° to 50° and the Cascade "Santocel" cycles minus 120° and lower.

Among the numerous applications is contraction in compound fitting of metal parts. This facilitates slide fits in assembly operation, relieves strain and possible fractures. Exhaustive tests indicate that sub-zero tempering and stabilization of high speed tool steel produces an exceptional combination of hardening, strength and ductility.

Pictured is an installation in a large machine tool plant doing extensive war work. The operator is inserting a machine tool spindle in the unit. This is done so that costly anti-friction precision bearings may be assembled easily and permanently without damage. The latter is of particular importance today because machine tool manufacturers



AUTOMATIC DIE HEADS

COLLAPSIBLE TAPS

BORING HEADS

FRICTION TAPPERS

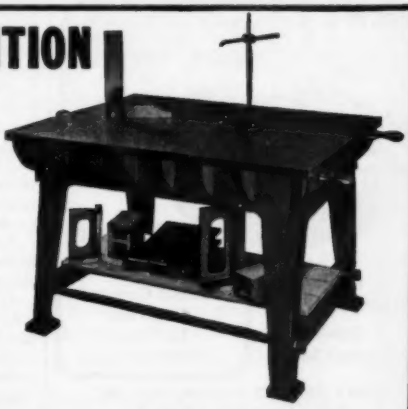
SPECIAL THREADING MACHINES

Model BR Collapsible Tap above—

Live spindle type—Work remains stationary—Tap revolves. Also made in Model B where work revolves and tap remains stationary. By the use of the external trip design, these two models are simply made with a few parts.

The RICKERT-SHAFER Co.
ERIE, PA.

A USEFUL ADDITION



Modern precision machine shops and inspection departments will find this sturdy 36"x 48" MILWAUKEE SURFACE PLATE a valuable addition. Constructed of semi-steel, accurately machined, securely mounted on cast legs which are machined and provided with SAE adjusting screws for perfect alignment. Height from floor to top of plate 30". Can also be had in 38". Shipping weight 1200 lbs.

We also manufacture angles and parallels as shown underneath surface plate.

We also make larger and smaller plates either with planed or scraped surfaces, whichever is desired. *Write today for full information.*

J. C. BUSCH COMPANY ENGINEERS AND MACHINISTS SINCE 1907
165 SO BARCLAY ST. MILWAUKEE, WIS

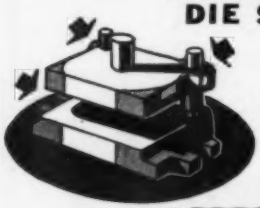
RUGGED PRESSES
BRONZE BEARINGS

Built like the "big ones" are the mighty Duro Four Ten and One Ten Punch Presses.

Heavy bronze bearings, rugged frames, precision construction for high-speed production at low cost. Write today for illustrated catalog on Duro Punch Presses, Bench Milling Machines and Accessories.

DURO MANUFACTURING CO.
Punch Presses . . . Milling Machines . . . Accessories
804 E. 61st ST. • LOS ANGELES, CALIF.

DANLY **PRECISION DIE SETS**



THEIR PRECISION
Means Greater Accuracy In Your Production

Danly Commercial Sets
Danly Special Sets

DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.
MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
Ducommun Metals & Supply Co.
Los Angeles • San Francisco

DANLY PRECISION DIE SETS

Screw Machine Cams

IMMEDIATE DELIVERY

George L. Detterbeck Co.
Formerly Banner Mfg. Co.
1871 Clybourn Ave. :-: Chicago, Ill.

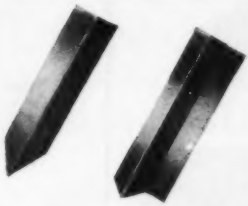
have been forced to employ some unskilled help and in assembling bearings with a drive-fit to shafts, care must be taken not to damage the bearing which is both costly and difficult to replace without effecting a delay in production and delivery of vital war goods.

Bearing shoulder of the shaft shown is approximately 2" in diameter and can be shrunk .001" to .0015" in 40 minutes at 50° below zero.

Another important use in this plant is shrinking steel sleeve type bearings used in cast-iron fixture housings for supporting and guiding precision boring spindles for airplane boring machines. The bearings are usually made .0005" oversize, or larger than the bore in the cast-iron housing. The bearings are frozen to shrink (usually .001"—depending on size of bearing . . . larger units shrink more in same time than smaller units), and placed in housing with ease. When room temperature is reassumed, the bearings have expanded to an accurate and tight fit.

Advantages of the unit in this plant, according to the engineering department, are:

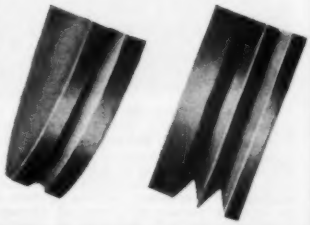
1. Eliminates messy handling of dry ice. 2. Eliminates loose fit of bearings on spindles. 3. Eliminates misuse of bearings during assembly. 4. Eliminates spoiled bearings and saves subsequent delay in re-ordering part for special machine which is close to completion. 5. Saves time in assembling boring bar bearings used in precision boring machines. 6. Eliminates out-of-roundness and misalignment caused by excessive poundings on bearings during assembly.



"PENCILPOINT" DIAMONDS

FOR TRUING GRINDING WHEELS

These diamond tools are regular equipment in the grinding of broaches, form milling cutters, ground taps, punches, dies, etc. Send us your inquiries; or blue print of wheel outline for our recommendations. $1.50 each; discounts in quantities.



For information and circulars write

F. F. GILMORE & CO.

112 Dartmouth St., Boston, Mass.

The New **CATSKILL — WET-TYPE**

Abrasive Cut-Off Machine

Abrasive wheel cutting is the modern way to speed up operation and lower cutting cost. This machine cuts tubing to 3", solids to 2" accurately, smoothly. Especially recommended for cutting high alloyed hard steels and many other materials. Designed and engineered for high production, ease of operation, safety, and long life. Prompt delivery.

For detailed information, write for Bulletin No. 6.

CATSKILL METAL WORKS, INC. — CATSKILL NEW YORK

You don't have to have volume to maintain pressure. RACINE Variable Volume Hydraulic Principle provides for pumping only the amount of oil actually required to maintain a desired pressure. This saves the horsepower normally wasted by a constant volume system in by-passing excess pressure oil through a relief valve. It reduces oil heating and improves performance in holding, clamping and forming operations.

RACINE Pumps are made in three sizes to give a maximum operating volume from 0 to 12, 20 and 30 gallons per minute and any operating pressure from 50 to 1000 lbs. per sq. inch. Write today for our complete catalog P-10-C. Our engineers will be glad to show you how our equipment can be readily designed into your products to give them an added power reserve.

★
★

STAMP OUT WAR with WAR SAVINGS STAMPS

★
★

RACINE TOOL & MACHINE CO.

1754 STATE STREET · RACINE, WISCONSIN

Time Study Equipment

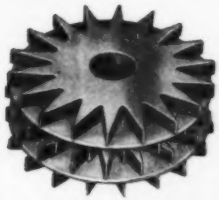
The Durant Mfg. Co., 1928 Buffum St., Milwaukee, Wis., announces a new bulletin, "No. 100," designed for department heads interested in production, time study, cost accounting and research in industrial plants. The book gives in compact form, details on the Productimeter line of standard counting and measuring machines, is profusely illustrated, and will be helpful in determining the equipment needed for industrial counting and measuring uses.

Most applications are filled by standard models of Stroke, Lineal, and Rotary types of counters, and with the accent today on greater speed in the essential industries, it is vital that every piece, every part, every machine operation be accurately counted to avoid waste of time and effort, to permit the direction of precious man-hours into the most needed channels.

DESMOND

GRINDING WHEEL

DRESSERS and CUTTERS



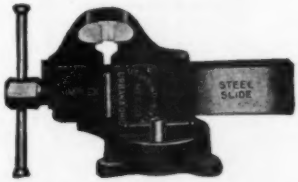
We can supply you with the proper Dressers and Cutters for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

SIMPLEX

Steel Slide

VISES



A full line of Machinists' Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

The DESMOND-STEPHAN MFG. CO., Urbana, Ohio

BAY STATE *Hand Tapper*

Necessary in any tool room

It cuts direct hand tapping labor costs 75% in tool and die rooms and machine shops. Makes quick accurate tapping easy. Assures holes tapped at right angles without the aid of a square. Does away almost entirely with tap breakage, spoiled work and consequent delays. Ready instantly for any hand tapping job from No. 5 to ¾" tap.

PROMPT SHIPMENTS

Manufacturers of **PRODUCTO DIE SETS**

THE PRODUCTO MACHINE CO.

990 HOUSATONIC AVE. BRIDGEPORT, CONN.

3017 MEDBURY AVE. DETROIT, MICH.

Write for descriptive bulletin 201

NO. 1 HEAVY DUTY GEARED HEAD HAND MILLER

Table: 6"x24"
Capacity 5½"x8½"x18"

Geared Spindle Speeds — 6 forward, 6 reverse. Optional spindle speed ranges available. 150-675 r. p. m.; 200-900 r. p. m.; 350-1350 r. p. m.

Anti-friction speed and spindle assemblies.

Built in coolant pump and piping. Motor in base.

PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.

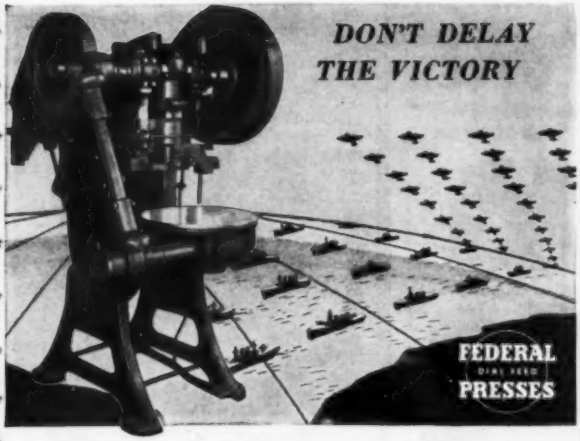
149 BROADWAY, NEW YORK, N. Y.

Misuse

There are at least three major causes of abuse of machinery. One is the operator who does not understand his machine. This is often the case in times like these, where an influx of relatively green operators replaces those taken from machines. Another cause is neglect of maintenance, for once a machine has begun to develop wear in its essential parts, that wear tends to develop at an ever-increasing rate. Consequently, to continue using the machine before giving it attention it needs, is really to abuse it. The third cause, highly prevalent in these days of high production demands, is to overstrain the machine, the cutter or both.

Carefully considering the importance of sustained production in these days, it seems that, in a sense, neglecting to install a new machine that is available, when it would increase the production flow in general, or neglecting to take proper care of the machines already at work, is closely akin to negligence. So-called preventive maintenance which looks ahead, foresees the probable cause of machine breakdowns, and immediately takes measures to prevent their development, was never more important than it is today. Tools for checking on machine condition and machine performance are readily available. Let us have them at hand, and let us use them. To do so will assure a sustained and heavier flow of supplies from the end of the production line.

Buy U. S. War Savings Bonds



SPEED PRESS OPERATIONS WITH FEDERAL DIAL FEEDS

DON'T let incompetent press equipment delay victory! *Speed up* many operations *3 to 6 times* by using Federal precision-built presses with multiple dial feeds. Positive indexing and locking mechanism smooths out action of dial — permitting unusually rapid production with exceptional accuracy and safety to the operator. Easily indexed to any part of the crankshaft revolution from 90° to 180°, giving long or short dwell of the dial. Cannot skip or coast by stations. Available in eight sizes of Federal Presses. Write for facts today.

THE FEDERAL PRESS CO.
808 Division St., Elkhart, Indiana.

Many Federal Models

Federal Open-Back, Inclinable Presses are available in nine sizes, with capacities ranging from six to 80 tons — either flywheel or geared type. They represent the culmination of Federal's 40 years' intensive experience in press building.

Cutting Tools

A peculiar aspect which operates to retard progress in the individual plant, lies in the way many regard their cutting tools. A large machine tool, regarded as a capital asset, and depreciated on the books at some 10% per year, seems to be considered more in the light of an investment, while the cutting tools which provide "teeth" for that machine, are often charged to operating expense at 100% of cost the first year, and regarded as expense rather than an investment. Thus we have a peculiar situation arising wherein a highly modern and efficient machine, possibly the last word in its particular field, is fitted out with inadequate cutting tools. Since no machine can possibly be better from a production standpoint than the tools with which it is fitted, a definite hardship is worked on the production line.

The operator who understands his machine so well that he can do a great deal more work with a lesser number of cutters than the other fellow, is a valuable man. But it does not follow that he would not be far more valuable if he had all the tools he needed to make the best possible showing. Nowadays in particular, no one should handicap any production unit because of an attitude which interprets cutting tools as "expense." If necessary cutting tools are "expense," lack of them is something much worse.

Buy United States War Savings and Stamps

P SPECIAL PURPOSE
NUT SLOTTER
THE MACHINE ACCEPTED BY THE AIRCRAFT INDUSTRY

Slots Two Sizes at once

Slots all aircraft sizes and all materials

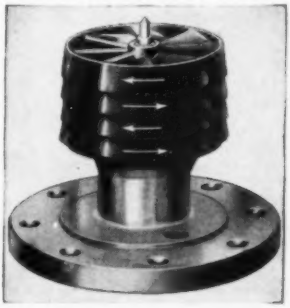
- 6 CUTTERS MILLING CONSTANTLY . . . . .
- 2 CONVEYORS RUNNING CONTINUOUSLY . . . . .
- AUTOMATIC INDEXING . . . . .
- AUTOMATIC BURR REMOVAL . . . . .
- AS HIGH AS 3000 SLOTTED NUTS PER HOUR . . . ALL SIZES FROM 3/8 to 1 15/16 HEXAGON ACROSS FLATS

Larger Machines Avialable

PELLOW MACHINE CO.
13510 Foley Ave., Detroit, Mich.

Plastic Rotors Replace Aluminum

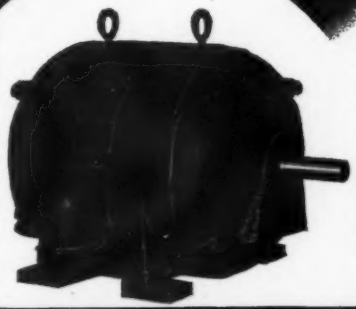
Faced with a lack of aluminum due to war conditions, the Logan Engineering Co., will aid in conserving this essential metal by using molded plastic rotors of black phenolic resin in their Logan Aridifiers.



Each Aridifier uses 4 of these vaned rotors which are driven by the air in the line. Two of the rotors revolve from left to right and their alternates from right to left. Moisture, flecks of oil that by-pass the compressor piston and pipe scale all impinge upon the rotor's blades or vanes and are thrown, by centrifugal force, against the walls of the housing into a dead air zone. Function of the Aridifier is to clean air or gas lines of contamination, and rotors are the heart of the equipment's effectiveness.

For more than a year, Charles Crofton & Co., (Engineers) Ltd., of Wallsend-on-Tyne, licensees of the Logan patents for the manufacture of Victor Aridifiers in the British Isles, have been testing plastic rotors under all manner of service conditions. According to officials of the English company, plastic rotors have several marked advantages. Inertia is much less with the plastic type which greatly increases the efficiency of the Aridifier. Then, too, the rotors are pre-balanced, and do not require expenditure of labor in balancing after machining. The new type rotors will turn on ball bearings like the present cast aluminum ones.

LIMA Electric MOTORS



A complete line of Ball Bearing equipped Squirrel Cage type Industrial motors, built to NEMA specifications in sizes from ½ to 75 H.P.

The Lima Type RS Motor shown at left is designed to afford maximum protection in locations where splashing or dripping liquids, chips or filings, etc., are present. Reduce maintenance and operating costs with Lima Electric Motors.

Write today for additional data.
PROMPT DELIVERIES

THE LIMA ELECTRIC MOTOR COMPANY, LIMA, OHIO
Offices - New York - Detroit - Chicago

SAVE SKILLED LABOR AND PRECIOUS TIME WITH THIS HIGHLY EFFICIENT PRECISION DRILL GRINDER

BLACK DIAMOND

FOR SMALL GAUGE AND FRACTIONAL DRILLS

Hundreds of War Production plants are saving valuable time and skilled labor costs by using Black Diamond Drill Grinders for sharpening small gauge and fractional drills.

On a Black Diamond, without mechanical skill or knowledge, anyone can produce quantities of perfectly sharpened drills with lips of uniform length, correct angle and clearance, to speed production—save expensive drill stock—reduce drill breakage and release skilled labor for more important work, install a Bench or Pedestal type Black Diamond Drill Grinder at once.

The Diamond Dresser keeps the grinding wheel sharp cutting and the Web Thinning Attachment efficiently cares for the grinding of Notched, Colton or Crank shaft points.

Write at once for more complete details.

BLACK DIAMOND SAW & MACHINE WORKS, INC.
NATICK, MASS.

Let us remind you of . . .
"THE MIDGET"
Of Our Coolant Pump Line

For applications requiring a small coolant stream we have designed Model 16-S, to meet "small-space" needs. It incorporates the assured-flow construction features of all Eastern Coolant Pumps.

Features of Model 16-S

- Pump will deliver 2 gallons per minute against 3 pounds pressure — maximum delivery slightly less than 4 gallons per minute.
- Equipped with 1/30 HP totally enclosed fan cooled motor, available either for 110 or 220 volts, 60 cycle, single phase current.
- Outlet nozzle tapped for ¼" pipe, and externally ribbed for attachment of ½" or ⅝" inside diameter rubber hose.

Write for complete information
EASTERN ENGINEERING COMPANY
42 Fox St., New Haven, Conn.

Crofton & Company has made its plans and formulas available to the parent company, Logan Engineering Co., 4912 Lawrence Ave., Chicago, who will soon be in production on Aridifiers with the new type rotors. These rotors will have bronze inserts in which the bearings will be mounted, whereas the Crofton Company mounts bearings directly in plastic.

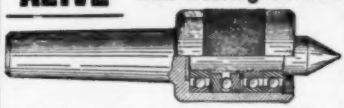
Cutting Tool Catalog

McKenna Metals Co., 135 Lloyd Ave., Latrobe, Pa., offers a new catalog 42V covering specifications and prices of Kennametal steel-cutting carbide tools and blanks. It contains drawings and large illustrations of the firm's standard type tools, and their applications. Several pages show selection and design of tools and blanks, chip breaker designs, correct grinding, boring tool set-ups and other engineering data. A visual index covering inside of front and back covers makes it simple for the reader to find information relative to exact type of tool in which he is interested.

SAVE TIME when 'time is short'

TOOL POST TURRETS FOR ALL LATHE SIZES
Saves on Setting Up — Saves on Repeat Operations
WRITE
C-W-C CORPORATION
HAWTHORNE, CALIFORNIA

"ALIVE" Ball Bearing Centers

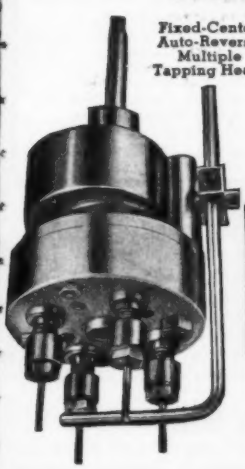


"They turn with the work"
Write TODAY — and let us tell you more about them.
MODERN MACHINE CORP.
323 Berry St., Brooklyn, N. Y.

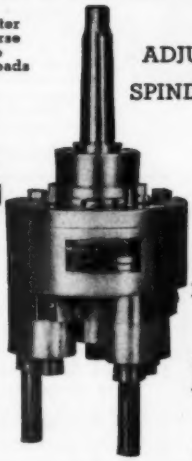
ERRINGTON MECHANICAL LABORATORY

STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS



Fixed-Center Auto-Reverse Multiple Tapping Heads



ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD

All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles

Super-Sensitive Fixed-Center Multiple Drilling Heads

WAR PLANTS

Steel Boxes for Your Production Needs

SHOP BOXES—Straight Side

No. 401—10"x16"x6"—18 Gauge—$ .85 ea.

No. 402—12"x18"x8"—16 Gauge—$1.10 ea.

A straight side shop box with rigid handle and hook hole each end. Excellent for shop use where stacking feature is not required.

STACKING BOXES

No. 601— 10"x16"x6"—18 Gauge —$ .95ea.

No. 602— 12"x18"x8"—16 Gauge —$1.25ea.

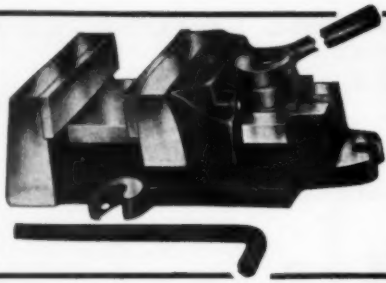
An ideal all-purpose shop box. Sturdy all-welded construction. Heavy skids act as a positive stacking lock and re-inforce box at point of maximum wear.

PRICES F.O.B. FACTORY, PHILADELPHIA—ANY QUANTITY!

ORDER TODAY—WIRE WRITE OR PHONE—PROMPT SHIPMENT

AMERICAN METAL WORKS, INC.

1518 GERMANTOWN AVE., PHILADELPHIA, PA.



PLUNKET QUICK ACTION VISE
for DRILL PRESS OR MILLING MACHINE

Designed for production work, using an eccentric motion to apply pressure to jaws.
Eccentric motion moves jaw 5/16".

Size	Net Price
6" jaws, 1½" deep, opens 4"	$38.50

Pressure between jaws, with handle furnished, 2200 lbs. Net weight 36 lbs.

Our complete line includes Vises for Drill Presses, Milling Machines, Shapers, Grinders

WRITE FOR CATALOG

J. E. Plunket Machine Co., 1823 W. Lake St., CHICAGO, ILL.

Westinghouse 18" Searchlight

For use at industrial and ordnance plants, and aboard ships, a new 18" incandescent searchlight with pilot house control or flat base, is announced by Westinghouse Lighting Division, Cleveland, O.

Intense beam concentration is obtained by a primary precision-ground and polished silvered - glass reflector and a metal secondary reflector to permit continuous operation with lamps up to and including 1500 watts. A tandem reflector shield, mounted in center of primary reflector eliminates all secondary heat concentration on the lamp bulb. Heat dissipation is by radiation, permitting a dust-tight enclosure.

Body and back sections of housing are of sheet steel. Door and door frame are of cast iron with integrally cast hinge and lathe lugs. The door is clamped in position against a weather-tight heat-resisting gasket or graphitized asbestos.

Maintenance Hints Notebook

To keep the tools of war industries in full operation, a 2-volume set of maintenance rules and suggestions is now available to maintenance men concerned with the care of electrical apparatus in industry.

Written by Westinghouse engineers, the books include 220 pages and are made up of 15 chapters for loose-leaf insertion in 5x7" binders. Each chapter is brought up to date and additions will be made as conditions warrant.

Volume one covers inspection of electrical apparatus, insulation materials and applications, the cleaning, drying

For Machine and Tool Work & Quick Set-Ups

The only 3-way reading precision indicator. Accurate in either direction. Feeler mounted in centered cone bearings. .014 reading.

Price $5.00 plus postage *Write for folder.*

J. R. Reich Manufacturing Co.
45 E. Stroop Rd., Dayton, Ohio

CUB
VARIABLE SPEED TRANSMISSION

For "A" section V-belts—3.3—1 speed range—perfect belt alignment in all positions. Priced so low that no shop or machine need go without infinite speed selection. *See your dealer or write* $16.50

Standard Transmission Equipment Co.
3409 VERDUGO ROAD LOS ANGELES, CALIF.

SAVE PRECIOUS TIME!

WITH A **KALAMAZOO** METAL CUTTING **BAND SAW**

VICTORY

Victory depends on production speed! The Kalamazoo Band Saw is already saving vital time in hundreds of war plants. Ingenious basic design plus sturdy, ball-bearing construction throughout give it positive accuracy that saves precious steel and hours of machining time. New hydraulic controls make it possible to cut to within thousandths of an inch! Hydraulic cushioned action. Completely portable—saves set-up time. Cuts all shapes! *Write for specifications and information on prompt deliveries.*

8' x 16' and 8' x 24' CAPACITIES

MACHINE TOOL DIVISION
KALAMAZOO TANK & SILO COMPANY

508 HARRISON ST.
KALAMAZOO, MICH.

"SCHULTES"... The King of Motor Drives!

ALL HELICAL GEARED, UNSURPASSED IN POWER, EFFICIENCY, SAFETY AND COMPACTNESS

Write for Complete Detailed Specifications

WESTLOF TOOL & DIE COMPANY

4192 BELLEVUE AVE. • DETROIT, MICH.

Remember

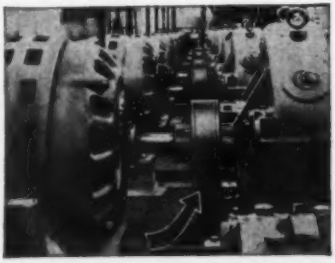
KANTI-LEVER COUPLINGS

Keep your Productive Machines out of the Repair Shop

Shutting down a productive machine for repairs is a serious thing today—why run this risk when the KANTI-LEVER COUPLING will enable you to avoid it? The KANTI-LEVER not only protects you against the evils of shaft misalignment like the ordinary Coupling, but it injects a resiliency into the driving torque of your Motors that absorbs the reoccuring load shocks and the torsional vibration that are the main causes of wear, fatigue and final failure of all types of machinery. See the cut below showing 70 KANTI-LEVERS that have run continuously for over 18 years and paid back their cost many times by rendering uninterrupted operation and greatly reducing repairs.

Send for Bulletin 28-B describing

Kanti-Lever Couplings



BROWN ENGINEERING CO., 126 N. THIRD ST. READING, PA.

and testing of insulation, commutator maintenance, starting and regulating a-c, d-c and squirrel cage induction motors. All the necessary information for proper maintenance of insulation and motors is given with diagrams, tables, and charts to make the text easy to follow.

Volume 2 is devoted to contactor maintenance, the inspection of transformers, and a chapter on transformer connections. A number of wiring diagrams embrace all of the more common connections for 2 and 3 phase, 25 and 60 cycle, power transmission.

Copies of maintenance hints notebooks are available to maintenance men from department 7-N-20, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Saftoid" Grinder Feed Wheels

The Machine tool industry which has been the back bone of our Victory production, uses thousands of hard rubber feed wheels for centerless grinders. Safety Grinding Wheel & Machine Co., Springfield, Ohio, announces

that their research engineers, have discovered a substitute for rubber in the manufacture of Regulating Wheels. They have named the new product Saftoid. It is asserted that these new feed wheels for centerless grinders cost less and last longer than similar wheels made of rubber.

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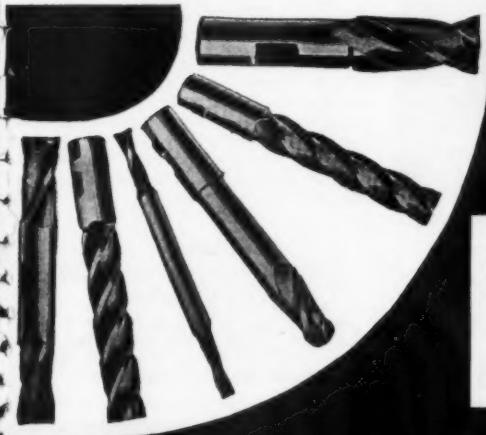
The Cincinnati Tool Co., 1945 WAVERLY AVE., CINCINNATI, OHIO



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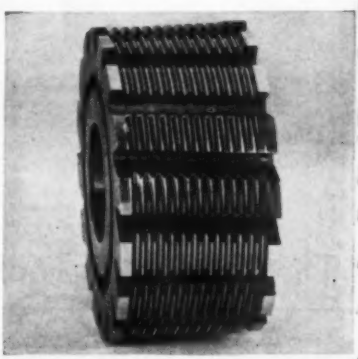
Faster Identification of Inspectors or Operators. Different borders may be used for different shifts. Available in 4 sizes. Write for prices today.

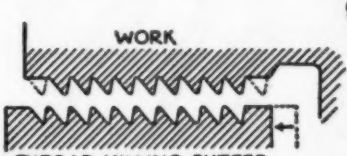
NEW METHOD STEEL STAMPS, Inc.
146 JOS. CAMPAU DETROIT, U. S. A.

Thread Milling Cutter Also Forms Turns

Buttress-thread milling cutters which relieve ends of threaded portion automatically by removing feather edge at end of thread as they mill the threads are now in regular production at Detroit Tap & Tool Co., 8432 Butler St., Detroit, for aircraft and other industries.



The thread milling cutters are available in three basic styles:—to relieve one end of thread only, to relieve both ends, or without plain cutting portions (no thread relief). The illustration shows a style of cutter designed to remove feather edge at both ends of thread.



The cutters can be supplied in any style to suit standard thread milling machines and in both spiral or straight gash types.

Becoming widely used for both external and internal milling of threads

SAVES LABOR

You will eliminate many costly hours from your Payroll by using the JACKSON TIME-SAVING VISE. It saves the time wasted by your Machinists in hunting for Bolts, Clamps, Angle Plates, etc., when rigging up work on the Drill Press, Miller, etc. Of still greater importance is the saving in output you effect by not having your productive machine standing idle during the rigging up process, for the—

JACKSON TIME SAVING VISE

by means of its revolving jaws and supplementary jaws instantly holds the thousand and one shapes that arise in machine work.

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BROWN ENGINEERING CO. 124 N. THIRD ST. READING PA

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BALL BEARING **GRINDERS**

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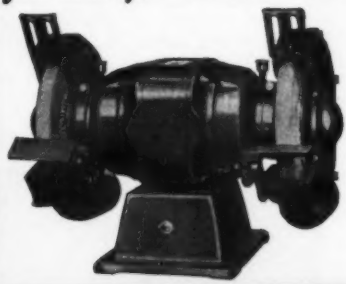
for Long, Hard Service



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Above: Baldor Special Carbide Tool Grinder, ½ h.p. ball-bearing motor, 6" Silicon Carbide wheels; **$95.00**
Ask for Bulletin 305.

At left: BALDOR Grinder No. 101; 1½ h.p. ball-bearing motor; 1725 r.p.m., 220 volts, 3-phase; 10" Aloxite wheels; **$90.00**
Ask for Bulletin 307.

BALDOR ELECTRIC COMPANY
4368 Duncan Ave., St. Louis, Mo.

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BEVERLY Throatless BENCH TYPE SHEAR

BEVERLY CUTS ANY SHAPE — Faster!

Cuts straight—round or any irregular shape without distortion. Accurate too! Hundreds of applications on "A1A" contracts, in shipyards, airplane factories and with our armed forces. Made in 3 sizes: No. 1 for 14 gauge. No. 2 for 10 gauge. No. 3 for 3/16 inch mild steel and 10 gauge stainless. Order today!

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HALF SIZE

We can supply this Indicator with or without lug on back. Also with support arm for mounting on surface gage. Light weight makes it ideal for use with magnetic base.

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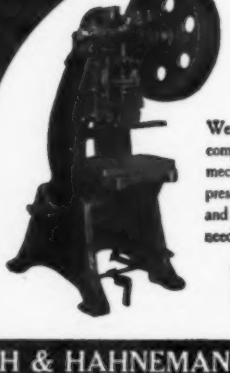
STOW, MASSACHUSETTS

RECLINABLE POWER PRESSES



We manufacture a complete line of mechanical power presses, with sizes and types for every need in your shop.

Write for bulletins.

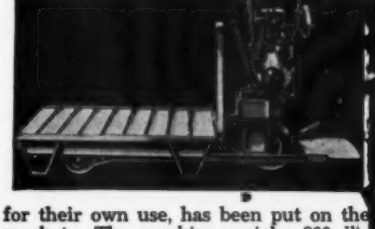
ZEH & HAHNEMANN CO.
Newark, New Jersey

on such parts as cylinder heads, propeller hubs, etc., the cutters are available in both shell and shank types. With the extremely close tolerances required for such work, the threads as well as the plain cutting portions are ground from solid.

This development materially facilitates assembly operations while also protecting ends of accurate threads against damage. Sketch shows manner in which feather edge is automatically removed at both ends as the thread milling cutter is fed lengthwise of thread.

New Motorized Truck

This Truck-Man, developed a year ago by Yard-Man. Inc., Jackson, Mich.,



for their own use, has been put on the market. The machine weighs 800 lbs. and has a capacity of 2000 lbs. It is said to be simple to operate and can be easily operated.

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Angle Plates for, Boring Mills, Drills, Grinders, Layout, Inspectors. Surface and Lapping Plates, Prompt Delivery.

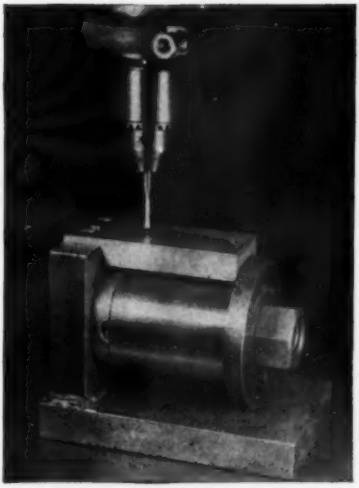
TATRA TOOL CO.
16317 Sanford Ave. - Cleveland, O.

New Alloy Cuts Hardened Steels

A new alloy material, available in drills, reamers and tool bits is speeding assembly, increasing production and cutting rejects in many metal working plants because it permits the full-hardening of steel parts before drilling, countersinking, boring, reaming and machining. This procedure assures accurately spaced holes and cuts, because any distortion caused by heat treatment occurs before work is done on the piece.

According to the makers it has also proved effective for work on armor plate, hard plastics and other hard materials such as amorphous carbon. The material is "Hardsteel," made by Black Drill Co., 5005 Euclid Ave., Cleveland, Ohio. The illustration shows drilling of a hardened steel liner for air tool cylinder.

These drills have proven useful in drilling die parts, gears, etc., after hardening. In many cases they have helped salvage valuable work pieces.



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Three grades of diamonds. Common quality $12 per karat. Medium quality $24 per karat. Select quality $48 per karat. (Contour template diamonds supplied only in Medium and Select quality.)

All diamond sizes ¼ to 10 karat are nib mounted for immediate shipment . . . Billed subject to approval. Specify quality of diamond wanted. We recommend a minimum size of one karat for each 6" diameter of grinding wheel. (24 hour resetting service, $1.00 post paid.)

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935 E. 41st Street CHICAGO, ILL.

RELEASE LARGER MACHINES FOR HEAVIER WORK !

This machine is ideal for tool, die, fixture and pattern work. Is versatile and accurate. Micrometer screw feed quill. Direct reading eliminates pencil figuring and possible errors. Smooth accurate boring is assured to any predetermined depth to 3".

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PUT SMALL JOBS ON THIS

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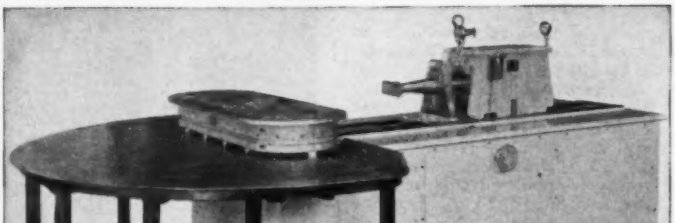
Forming Extruded Shapes



Developed primarily to reduce labor time and costs associated with forming extruded sections to various shapes, a new machine is announced by Southern Engineering Co., Inc., Los Angeles. Already in use by leading aircraft manufacturers, this metal forming machine is said to be speeding production of parts for airplanes by as much as 45 times, over former hand forming methods.

The machine consists of two basic sections:—the movable head onto which the dies are bolted, and the air ram to which mating die is attached. 5 hp variable speed reversible transmission system drives the head, thru reduction gears and a pinion system, at an infinite range of speeds between 91 and 275" travel per minute. Using normal air line pressure available in practically any plant, up to 2½ tons pressure is exerted by the air ram.

Formation of straight extruded sections into the desired form, which may involve any number of changes in plane as well as profile, is accomplished by attaching one end of straight section to the movable die and then drawing it between movable die and die block located on air ram. The metal is tightly confined to the cavities of the die and any type extrusion can be formed to the desired shape without wrinkling, and with a minimum of internal stresses. It is claimed that the

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Diamonds vary in quality and it is important to use the proper kind for a given job. "Bargain diamonds" are not an economy.

If you don't know diamonds know your diamond dealer. Our 45 years in this field merits your confidence.

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Accurate, High-Speed

MOREY VERTICAL SHAPERS

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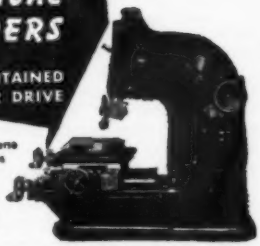
SELF-CONTAINED MOTOR DRIVE



Power rapid transverse feeds in all directions

Timken Tapered Roller Bearings for Main Spindle—all others anti-friction.

Built to highest accuracy standards the MOREY VERTICAL SHAPER is simple for tool-room manufacturing. Power feeds and power rapid transverse feeds in all directions are instantly available in all operating positions.

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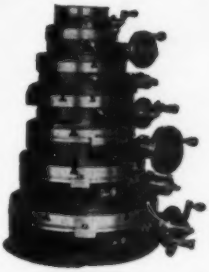
TROYKE ROTARY TABLES



Sizes 9", 12", 15", 18", 21", 25"

Ask your dealer or write us for eight page catalog.

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The Coolant Pump For Every Job—

BRADY-PENROD MODEL 600

Durable! This pump stands up under hard use. Hydraulic efficiency as high as 70%. Quickly installed by any shop man at little cost and easily moved from one job to another. Controlled flow—60 g.p.h. with ¾" tubing to 1200 g.p.h. with 1" pipe. ½ H.P. NEMA motor meets any demand with negligible current cost.

Tank With Built-in Baffle. 12" x 12" heavy galvanized sheet iron with baffle separator to collect heavy chips. Painted machinery gray outside. Removable lid for cleaning without disconnecting return piping.

Write or wire today to:

BRADY-PENROD, INC., Muncie, Indiana, U.S.A.

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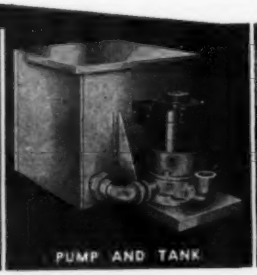
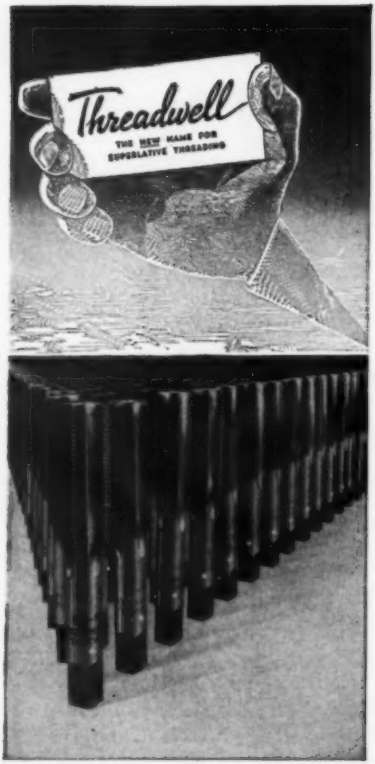


PUMP AND TANK

ON A LATHE



Tapping machine operators in key war industries everywhere are "discovering" in THREADWELL Taps the way to new records in threading performance. To them, this new name THREADWELL means *results* -- more holes per tap, and superlative quality. Have you tried THREADWELL?

WRITE FOR CATALOG ON YOUR FIRM LETTERHEAD.

THREADWELL TAP AND DIE CO.

GREENFIELD, MASS.

SALES AGENTS:
Canada - BRIDGE MACHINERY COMPANY, *Montreal*
England - SKYLUX, LTD., *London*

metal is actually reformed during th time it is drawn between the dies.

Three types of movable heads a available:—a circular one for the form ing of parts that have a symmetric radii or an interrupted radii with t straight sections; a semi-circular hea to form parts with straight section slow sweeps, curves and offsets; and straight head which travels only in straight line for the forming of wi spar caps, stringers and all other longi tudinal parts that have relatively sma sweeps or changes in plane. The fir two revolve forward or backward, thru a full 360 degree circle.

A typical example cited of the spee with which parts can be formed, is double bulb section part, of which on 2 per hour could be formed by han methods as compared with 30 part per hour on the machine. In additi to the higher speed of production, great improvement in uniformity parts is reported by firms using th machines. A minimum of skill is sai to be required, as contrasted to th high degree of skill required in han forming of extruded parts.

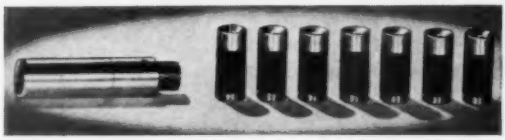
Such materials as magnesium, dura and stainless steel can be formed o the machine, in addition to aluminu alloys. With the use of a mandre tubular sections can be formed easily as conventional extrusions. I is possible to make open seam tubin flanged tubing, Hat sections, Z sec tions, in addition to tube bending.

Insulating Varnish

The Sterling Varnish Co., 138 Ohi River Blvd., Haysville, Pa., has re cently developed a new insulating var nish, designated as S-110, for applica tion to electrical apparatus that mus operate at abnormally high tempera tures. Tests are said to indicate tha S-110 will stand operating tempera tures at 250C. or higher.

According to the makers, when bake at 175-200C it dries all the way th the deepest winding and does not re soften when exposed to high operati temperatures; the dried film is mecha ically strong, exceptionally adhesiv and flexible, and retains these charac teristics under adverse heat condition

Green Master Feed Finger



An interesting and versatile new design of Master Feed Finger is announced by Green Mfg. Co., P. O. Box 704, Rockford, Ill.

The finger itself is of solid construction and there are no moving parts or springs to wear out or break. A soft insert of rubber-like composition is said to provide gripping tension, and by its softness prevent scratching or marring of polished bar stock.

One Green Master Feed Finger and a few inserts cover the entire size and shape range of the average screw machine. The makers point out that in the case of solid feed fingers, one is needed for each size and shape. They also draw a contrast with other master fingers requiring a different set of steel or bronze pads for every change in size or shape.

Having many times the grip length of conventional fingers, the Green design holds softly but firmly over a larger area without marring.

It is also stressed that unlike split spring fingers, this type is not affected by centrifugal force and the tension remains the same at all speeds. The pliable, elastic pad in the feed finger permits easy entry of the smallest bar stock. This simplifies reloading and no force or hammering is required. The pads are pliable and accommodate themselves to any conceivable shape of stock.

When stock is fed against the stop, it is asserted that the soft pad acts as a cushion to absorb the shock, and accordingly closer length limits can be maintained consistently. Further, each flexible pad can be compressed to take smaller stock than its nominal size. This same feature is used to increase grip tension.

Three simple operations are involved in changing inserts or adjusting for size or tension. Adjustment is merely a matter of selecting the insert covering the range in which the stock size falls. The insert is slipped into the finger, tensioning ring screwed on and then finger is placed in the machine.

A No. 00 master finger with a full set of 7 inserts covers the range from 0 to ¼". The 002 insert handles stock from 0 to 1/16" for instance, and the 008 insert covers the 7/32-¼" range.

TURRET TOOL POST

Hardened throughout, self-compensating for wear, precision built. For top production on small South Bend, Sheldon, Clausing, Atlas, Logan and similar bench lathes and small screw machines.

F & M SALES COMPANY, HOLLYWOOD, CALIF.
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Mill Over 1,000 Parts Per Hour
WITH THE
NEW Dearborn Automatic Chucking and Indexing Fixture

Work held by draw in collets. Collets open and close automatically. Work automatically ejected. Indexes without loss of time for milling 1, 2, 3, 4, 6, 8, 12 or 24 sided pieces. Minimum set-up time required. Speeds up production. Positive and accurate in operation.

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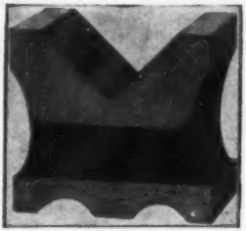
72 S. CLIFF ST. ANSONIA, CONN.

"TRU-V" BLOCKS



Why Not Save Time—by having enough V-Blocks available at all times in your shop to avoid the delays involved in make-shift set-ups and tie-ups?

"TRU-V" Cast-Iron Blocks are available in nine sizes—from 3½ to 10", in three styles. Each block is carefully machined on all sides, with close limits held within .001" where required. A machined ledge on both sides provides for clamping on machine bed.

Let us send descriptive bulletin.
Or contact your mill supply dealer.

Oliver Motorcraft Corp.
2532 S. Wabash Ave., Chicago, Ill.

Magnetic Welding Clamp

A holding magnet or magnetic welding clamp has been designed by Stearns Magnetic Mfg. Co., Milwaukee, Wis. Available in various sizes, the one shown in the illustration is of 10" diameter and weighs approximately 7 pounds, providing a pull of 2,000 pounds on ¾" and 1" steel plates and operable from 40 or 60 volts d-c. Terminal for energizing cable is well protected from shock and damage.

These Stearns electro magnets are finding numerous applications in such industries as ship building and are used extensively in connection with welding operations where they are used advantageously in drawing and holding plates together to facilitate welding processes.

In ordinary welding operations, when plates are drawn together, invariably one is higher than the other. By use of the holding magnet it is asserted that the plates are drawn to a level alignment with the edges brought flush against the smooth surface of the magnet. By tacking welds to the plates

Lead screw ground from the solid AFTER hardening

CRITERION *Boring Head*

SMOOTH and compact. Constant accuracy. Parts subject to wear are hardened. Large offset adjustment eliminates need for offset boring bars. Lead screw is hardened tool steel. Its threads are ground from the solid AFTER hardening.
Criterion heads are unexcelled in accuracy, in ability to withstand constant use. Two sizes 1¼" and 3". ¾" and 1" bar capacity. Order from your dealer or write direct. Request free literature. No obligation.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

600 ROOMS with BATH and RADIO

FROM $3.00

- **Ideal Location**
- **Unlimited Parking**
- **Radio in Every Room**
- **Refurnished & Redecorated**

HOTEL PHILADELPHIAN
DANIEL CRAWFORD, JR., Manager

PILLOW BLOCK
Balancing Ways

Especially suited for large diameter work, as a sub-base can be made of proper height to give necessary clearance for work.

Anderson Pillow Block Balancing Ways are precision built with chilled iron discs which rotate with minimum friction on sensitive special bearings. Many manufacturers have endorsed them for profitable, efficient, static balancing.

Write for Details

Built in 1000, 2000, 5000, 10,000 and 20,000 Capacities

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BROS. MFG. CO.
1907 KISHWAUKEE ST., ROCKFORD, ILL.

CUT SANDING COSTS

MITY-MIDGET
HIGH SPEED BLOCK SANDER

- ★ **No Vibration** — Therefore not fatiguing
- ★ **Non-Stalling** — Because of super-speed
- ★ **Fits Any Job** — Even fillet work
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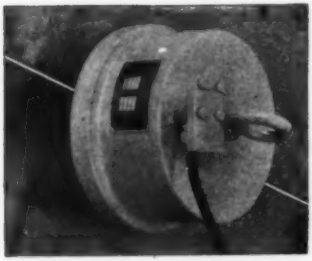
The smallest high speed block sander on the market ... flexible, light weight and compact ... cuts labor and abrasive costs 50 to 75% ... perfect for feathering ... adapted to metal, wood and composition surfaces.

Write for Descriptive Folder "MT"

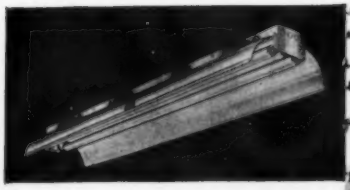
NATIONAL AIR SANDER, INC. ROCKFORD ILLINOIS



on either side of the magnet, the welder is able to maintain alignment, a quick, satisfactory time and labor saving solution to his problem.

Guth Industrial Luminaires

Edwin F. Guth Co., St. Louis has developed a new line of Porcelain Enamel Industrial Fluorescent Luminaires including the XLO Flu - O - Flector, closed-end type and the Victory XLO, open-end fixture. The new fixtures (less accessories) have been designed to use a minimum of steel. The XLO



uses only 15 lbs for 48" sizes and 18 lbs in 60" units. The Victory requires 12 and 15 lbs respectively for these sizes.

"Bump-Proof Socket Plates" are said to protect lampholders from breakage in transit, installation or cleaning. The starters are conveniently set in side of channel for ready accessibility. Reflectors are easily removed.

Luminaires are available for 2 or 3 40 watt lamps and 2-100 watt lamps and may be mounted individually or in continuous runs with flush-ceiling or suspended mountings.

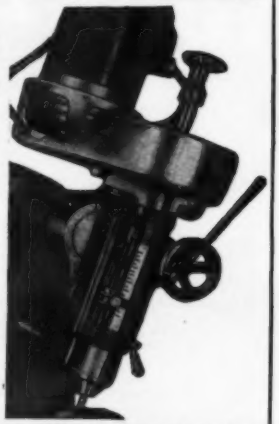
EKLIND UNIVERSAL MILLING HEAD

CAN BE ADAPTED TO ANY MACHINE

MILLS DRILLS BORES at any angle

Speeds from 250-4000

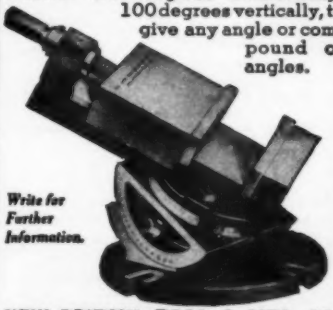
Write for Circular



UNIVERSAL HIGH SPEED TOOL CO.
551 W. Washington Blvd. Chicago, Ill.

New Britain UNIVERSAL VISE

Swivels 360 degrees horizontally, 100 degrees vertically, to give any angle or compound of angles.



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NEW BRITAIN, CONN., U. S. A.

LIFTS 14"—TURNS 360°

This Handier WELDING TABLE is Hydraulically Operated

Convenient, safe positioning—done hydraulically—without gears or ratchets! This Lyon elevating Welding Table gives you the range and flexibility you need for fast, easy, effective welding. Elevates by foot pedal a full 14" above lowered position. Pivots through full circle. Also useful for leveling long work on shears, drill press, or bench. Capacity 2,000 lbs. Table 30" square. Write for circular 129.

LYON

Caster-base Elevating Table

Full hydraulic operation, foot pedal lift and release. Stable; easy to wheel about. Handy for moving dies, for transferring heavy parts from machine or workbench, or for supporting and positioning parts in assembly. Write for circular No. 124.

LYON-Raymond Corporation

Formerly Lyon Iron Works . . . Established 1840

169 Madison Street **Greene, N. Y.**

Vibration

Eliminating of vibration in any given place is practically always based on the proposition of absorbing it between its source and the point in question. Elements which do not transmit vibration readily are practically always interposed. Therefore vibration engineers make much use of the term "isolation." Such elements take different forms in different cases. In that of a highly efficient scale, made by an outstanding manufacturer, a small flexible connector is used to connect a sector arm to the sector proper, the sector being fitted with gear teeeth to drive the pinion of the scale pointer-shaft. Only the steady pull of the weight is transmitted, and no dancing scale-pointer results.

In the case of heavy machines which originate a great deal of vibration and as a result could be injurious to buildings where installed, to other equipment, and to the nerves of everyone close around, isolation is accomplished by setting machines on cork, or felt foundations. Heavy pads of such material are interposed between the bases of machines and the floor. Such foundations are obtainable from various sources. Rubber, too, when available, is highly useful as a means of isolating shock and vibration. In some cases, it has been used in flexible couplings of shock-absorption type. One of these uses 6 rubber balls in 6 cylindrical pockets in the coupling. Sudden shocks are taken up by deformation of the balls.

The scales mentioned are the Kron scales. Armstrong Cork has provided cork machine foundations of type described. The Felter Co. provides felt pads for this purpose. The rubber-ball flexible coupling mentioned was developed by Crocker-Wheeler Electric Mfg. Co., Ampere, N. J., about 1931.

Multiple Shift Tool Stands

Handy new tool stands are announced for individual storage of tools for workers on one, two, or three shift operations.

These stands are useful around production machines and in toolrooms as toters up to the job; for assembly lines, parts and tool transporters for maintenance men, equipment carriers for inspectors and for stock picking and transportation.

Drawers can be locked to guard important tools. Drawers feature easy sliding and flat key locks.

The stands, with 1, 2, or 3 drawer inserts are fully illustrated in the new Shop Equipment Catalog No. 331 just released by Lyon Metal Products, Inc., 3042 Clark St., Aurora, Ill.

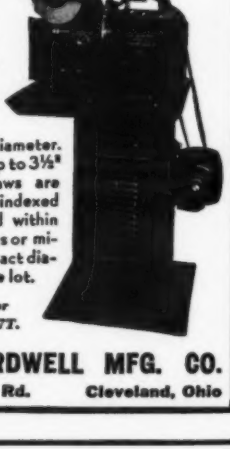
Hydraulic Elevating Welding Table

This table has proven a handy piece of equipment in welding shops. Tho it ordinarily would not be called a welding positioner, it does serve this purpose well in many instances.

YOUR FIRST LINE OF

DEFENSE against

HIGH SHARPENING COSTS



No. 57T

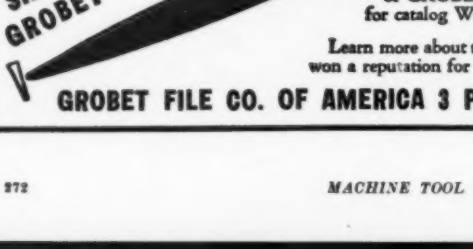
Automatically Sharpens Metal Saws in gangs up to 8" in diameter. Takes gangs up to 3½" thick. The saws are automatically indexed and sharpened within variation of plus or minus .001 of exact diameter of entire lot.

Write for Folder 57T.

THE WARDWELL MFG. CO.

3165 Fulton Rd. Cleveland, Ohio

5000 SHAPES AND SIZES GROBET Swiss Files



Ask for Catalog WF.

The most complete catalog of its kind. Lists 5000 different shapes, sizes and cuts of GROBET Precision Swiss Files. Ask also for catalog WM on files for filing machines.

Learn more about these Chrome Steel Files that have won a reputation for utmost precision and durability.

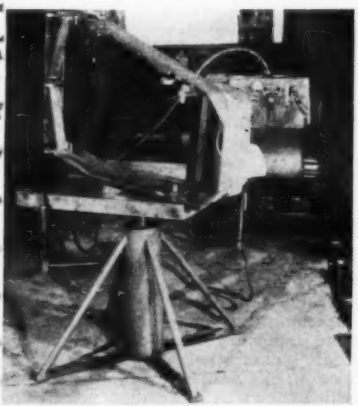
GROBET FILE CO. OF AMERICA 3 Park Pl., New York, N. Y.

The "BABY GIANT"
VANDERBEEK Universal Joints

are obtainable in two sizes—the "Baby Giant" for instrument and control work; and the "Giant", with hardened and ground working surfaces for heavy duty work.

Send us your requirements — We'll send you prices.

AMERICAN TOOL WORKS, INC.
26 FRANCIS AVE. -:- HARTFORD, CONN.



The operator can keep the work at the most convenient welding height by means of a foot operated hydraulic pump. Work also can be turned to the most convenient position, as the table revolves as well as elevates.

Standard stock size of table has a capacity of 2000 lbs, platform size 30 x 30", lowered height 26", elevated height 40", elevation 14".

It can also be made in other sizes in addition to this standard size. It is made by Lyon-Raymond Corp., 942 Madison St., Greene, N. Y.

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Numbering Machines
Automatic and Hand Operated
for stamping in Metal, Fibre, Plastics, etc. Do faster and better work than Single Steel Stamps.
For Marking Metal Parts, Name Plates, Metal Checks, etc.
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brings all adjustments under absolute micrometric control of the operator without stopping tool or machine. In Jig Borer, Milling Machine or Horizontal Boring Mill, it bores, faces, counterbores, turns outside diameters, mills flat surfaces and slots, under-cuts, recesses, back-faces and does an almost limitless range of "headache" jobs. Send for bulletins. Address all communications, inquiries and orders to

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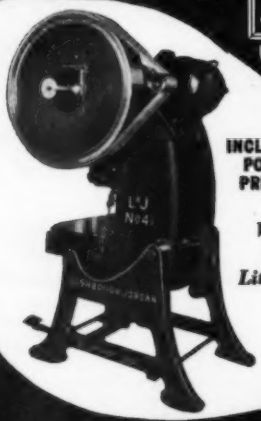

INCLINABLE POWER PRESSES

Write for Literature

L & J PRESS CORP.
successors to Lakhovitz-Jordan Tool & Machine Co.
1825 STERLING AVE ELKHART INDIANA

Weld Inspection Chart

An arc welding inspection chart which will provide welding inspectors and others concerned with weld production a simple and extremely helpful aid for use in inspecting welds, has just been published by The Lincoln Electric Co., Cleveland, Ohio.

The chart, presents very graphically the different types of welds obtained when the work is done normally, with normal current, voltage and speed, as compared with those obtained when these factors are not normal.

"Upon inspection after welding, certain tell-tale signs reveal considerable information to a qualified inspector," according to A. F. Davis, Vice-President of the company.

"Items to consider in inspection after welding include size and shape of bead, appearance of bead, undercut, overlap, location of craters, (indicating where operator started and stopped welding). A study of the weld and proper interpretation of tell-tale signs will disclose other conditions of welding."

These conditions are illustrated by enlarged and detailed photographs on the chart.

Accompanying the photographs is a table indicating burn-off of the electrode, penetration of fusion, appearance of the bead and sound of the arc with each value of current, voltage and speed of welding. For example, with normal current, voltage and electrode speed, burn-off of electrode gives a normal appearance of weld coating, a fairly deep and well-defined penetration, excellent fusion of bead with no

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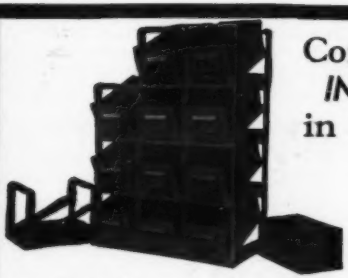


Contents of Shop Boxes *INSTANTLY ACCESSIBLE* in New Slant-Box Rack

This new type rack stores ordinary shop boxes at an angle which effectively converts them into accessible hopper-fronted storage bins.

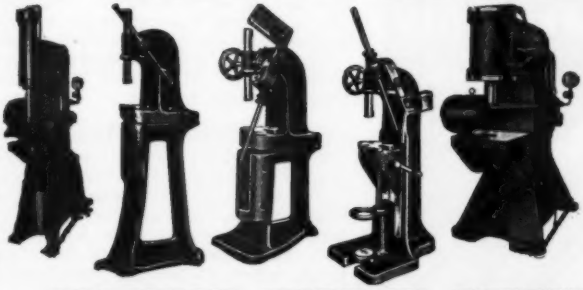
- Tilted runners hold boxes at proper angle, wide lip holds them securely in position.
- Slope of boxes keeps contents automatically feeding toward the front where they are easily reached.
- Patented Stackrack construction permits high stacking of interlocking units—gives maximum storage capacity.
- Welded construction, of heavy angle and channel steel, means long-lasting rigidity and strength.

Write for further details and low prices.

STACKBIN CORP.,
55 Troy St., Providence, R. I.

STACKRACKS
"STACKED AND STILL ACCESSIBLE"

For AIRCRAFT and MUNITIONS



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65 Standard Styles and Sizes. Manually operated presses ¼ to 35 tons pressure. Motor driven hydraulic presses 1½ to 30 tons pressure.

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SOCKET HEAD
CAP SCREWS
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PRODUCTS
SAFETY HOLLOW
SET SCREWS
Try Them On Your Next Job!
ECONOMY
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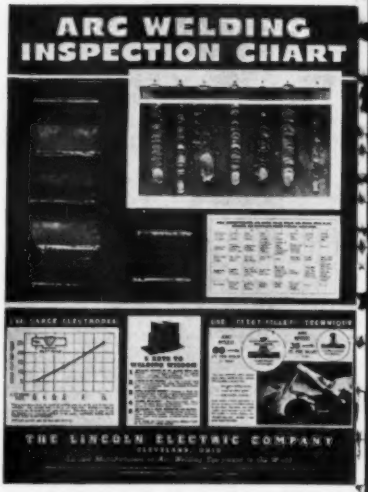
Heavy Duty
Live
Centers
Write for catalog on live centers
Adapted for heavy duty work. Precision type ball and roller bearings assure maximum capacity for high speed production and long service.
NIELSEN, INC. LAWTON, MICH.

overlap, and an arc that burns with a sputtering hiss plus sharp cracking.

The chart also illustrates use of the "Fleet-Fillet" technique of welding, developed by Lincoln, which nearly dou-



bles normal welding speed. The chart also illustrates how speed of welding increases as size of electrode increases.

The chart is available free of charge to inspectors of welding and others concerned with welding.

"Steel Strapping Shipments"

This is the title of an authoritative article contained in an 8-page folder just released by Acme Steel Co., 2821 Archer Ave., Chicago. Included are tables of sizes, weights and footages for both nailed and nailless types of strappings; tables on recommended sizes of strap for given package weights. A helpful series of 59 sketches reveals how shipments of practically every type should be reinforced for safe arrival. Two full pages of photographs illustrate interesting strap applications to a wide variety of items ranging from salt pork to giant army trailers, chemicals, crated planes, pulleys, tile, metal tubes and textiles.

ACCURATE REPEAT READINGS Speed Production

Maintaining the high quality standard of Lombard Governor manufacture, this "A" type Dial Indicator is ruggedly constructed to "stand the gaff" of continued repeat readings. It is a particularly desirable instrument for permanent mounting to machine tools and for production, assembly or inspection applications.

Stainless steel spindle. Brass gears and casings. 2" diameter dial turns to set zero to pointer position. Bezel clamp locks securely. Lug back standard; plain back for clamping on bushing furnished if desired.

Instantaneous readings in tenths, or thousandths, as desired. Also "Junior" size; mounts and clamps. Write for full details.

Cutaway view below shows gear arrangement and use of solid back and front plates applied directly to case. No dowels needed.

LOMBARD GOVERNOR CORPORATION
400 MAIN ST. ASHLAND, MASS. U. S. A.

Cooperation

Business is definitely not business in t time. If it were, organizations like e "Production Advisory Committee," mprising 16 St. Louis production ex- ts who solve one another's problems ound the conference table every nday night, could not prosper.

n peace time it is said that if a an can build a better mouse trap than s neighbor, the world will make a aten path to his door. In war time a man can make a better bomb than his neighbor, the Government will build a high wire fence and place armed guards at the gates to keep the world from making a beaten path to his door. Everything is guarded — everything except the man's secret which enabled him to make a better bomb than his neighbor.

On some Monday evening, the man will attend a meeting of the Production Advisory Committee at the St. Louis Ordnance District, 3663 Lindell Boulevard. There he will sit at a table with competitors who in peace time would be sued if they infringed on his mouse trap patent, but because he is a patriotic citizen he tells them exactly how to build his bomb as he does.

Not only that. He lends them tools. He swaps materials. He gives them tips on how to solve their production problems. If there is an operation they can't perform, he subcontracts to do it for them. He is as interested in production in his competitors' plants as in his own.

The Production Advisory Committee was organized 2 months ago, when the shortage of machine tools and manufacturing materials began to be a seri-

ous bottleneck in war production. Whatever the production problem, if it has to do with the manufacture of Ordnance Material, the 16 experts of the Machine Tool Panel tackle the problem and try to solve it.

Lt. Colonel E. H. Sager, head of the Ordnance Dept's. Mfg. Service, and Lt. H. W. Hempel, Contact Officer, represent the Ordnance Department on the committee. Other members are: Cal Stephens of Robert R. Stephens Machinery Co., Inc.; G. Eichelsbach, Jr. of American Stove Co., Ernest Dunford of Landis Machine Co.; Jonathan Kludt of Lincoln Engineering Co.; E. H. Nieman of Carter Carburetor Corp.; Morley Langford of Sunnen Products Co.; J. Sunnen of Sunnen Products Co.; Arthur Nuetzel of Blackman-Nuetzel Machine Co.; R. Laffler of Pratt & Whitney Co.; Hal Knight of W. B. Knight Machinery Co.; Henry Miller and F. G. Sachleben of Emerson Electric Mfg. Co.; O. W. Johanning of Colcord-Wright Co., and E. C. Meinholtz of Misouri Pacific R. R.

At the meetings there is no mention of war, of hatred, or of animosity; neither is there any expression of patriotism. The committee deals only in deadly weapons and projectiles—projectiles that must be hard and swift and accurate and plentiful to accomplish their mission. The only projectile in sight as the meeting begins is half of an 81 mm. mortar shell that serves as an ash tray. As the evening progresses, problems, political and economical and social, are solved—and one wonders, as he watches these experts correct production bottlenecks, if it is not in such an atmosphere that wars are won.

The local group is part of a nation-wide system of industry committees organized under supervision of Major General Levin H. Campbell, Chief of Ordnance, Services of Supply, for the purpose of obtaining the maximum final production in a minimum of time.

Delays in final production occasioned by lack of a few special parts are reported to have been decreased as the result of formation of the committees which offer mechanism for pooling the resources of each industry to produce maximum results.

Stainless-Clad Steel

A significant example of how stainless-clad steels are helping to conserve materials for war purposes is illustrated by this new Kettle made by Groen Mfg. Co., Inc., Chicago, Ill.

A considerable number of these units are being constructed of Silver - Ply Stainless-Clad Steel, furnished by the Jessop Steel Co., Washington, Pa. The entire inside and cover are protected

by a stainless steel surface. It has all of the desirable features of solid stainless steel kettles and based on initial acceptance will shortly be seen in wide use all over the country. Large quantities are now in service with the armed forces.

Stainless-clad steel should be used extensively during the present emergency as a substitute for solid stainless, because the relatively thin layer of stainless in the clad product requires less alloy and yet effects the desired corrosion resistance. A 20% clad sheet or plate of stainless-clad steel, for example, saves 4/5 of the stainless steel required in a comparable sheet or plate of solid stainless. Continued acceptance of stainless-clad after the war, is predicted because of its lower costs as compared to solid stainless.

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"DIE ACCURACY WITHOUT DIES"
PRECISION MACHINES

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DI-ACRO SYSTEM of
METAL DUPLICATING
—without Dies!

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314 8th Avenue S., Minneapolis, Minn.

Diamond Wheel and Diamond Lap Lubrication

A Lubricant manufactured specifically for this purpose is produced by the Stadoil Mfg. Co., Dallas, Texas. Just any lubricant will not suffice to produce the optimum tool finish on carbide tools. Diamond Lapping Oil is designed to eliminate the loading and glazing of diamond wheels and laps. Therefore, no pressure is required on the wheel or lap when sharpening carbide tools. It is emphasized that this elimination of pressure produces a tool finish with a bright polish, free from any scratches that otherwise show when any pressure is exerted on the wheel or lap. The product is said to be indorsed by carbide tool or diamond wheel manufacturers who use it in their manufacturing operations. Industrial or Mill Supply Jobbers stock this product or will order it.

Superfinishing Book

A new 140 page manual on Cylindrical Superfinishing has been published by the Foster Division of International Machine Tool Corp., Elkhart, Ind. This modern process of producing a refined finish on metal surfaces that reduces friction and adds to the life and operations of machines is described from 2 viewpoints: — the theoretical showing the need for superfinishing and how that need came about; and the practical telling methods of superfinishing.

Superfinishing today is fulfilling an important part in the war effort because of its use in the manufacture of such equipment as gun recoil pistons, gun mounts, airplane motor parts, antifriction bearings, airplane navigation instrument parts, and anti-aircraft fire control mechanisms, etc.

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Speeds layout time on brass, aluminum, copper, tin, stainless steel. Won't chip, crack, or flake off. Comes in handy 8 oz. bench type brush-in cans. Also pts., qts., gals., drums. *Send for sample now!*

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Salt Helps Combat Heat Fag

Tests in the laboratory and experience in the field have shown the value of common salt in sustaining physical effort during sweltering Summer heat.

The explanation is simple. Considerable salt is excreted from the pores of the body in perspiration. Every body cell, the blood stream, the spinal cord and the brain must contain a certain amount of water to maintain the proper fluid and chemical balances for normal body functions. Unless salt is present in the proper quantities, these vital parts of the human body cannot retain the necessary amounts of water.

When body salt is lost thru excessive sweating, and not replaced promptly, the vital cells lose water, upsetting the delicate fluid chemical balance of the tissues and body fluids. When the salt loss is slight, the first reaction may be a tired, uncomfortable, let-down feeling. If this unbalanced condition develops further, actual heat sickness and serious muscular cramps may ensue.

Salt has another important function, uniting with undesirable chemicals in the blood stream, transforming them into substances which can be eliminated thru the bowels and kidneys.

Lewis Semi-Finished

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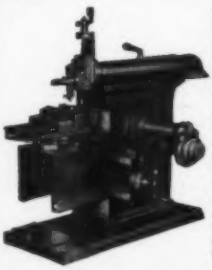
Complete with Vise — Prompt Delivery



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Most of your machining such as Drilling and Tapping operations are more easily done and at less tooling costs,

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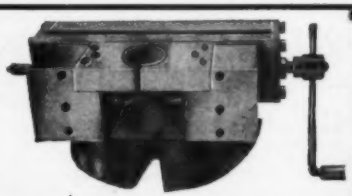

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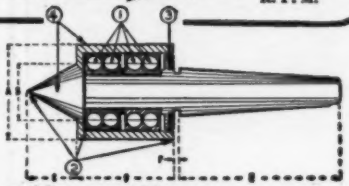
1. FOUR (4) ROWS of precision BEC-4 specification bearings.
2. Note SHORT OVERHANG assuring rigidity and accuracy—eliminates "chatter"
3. Positive FELT-SEAL—excludes dirt—retains lubrication.
4. HARDENED AND GROUND CONE—point accurate to within .0002.

5. HEAVY DUTY—Note Combined Radial Thrust Load at 100 R. P. M.

Morse Taper No.	A	B	C	D	E	Combined Radial-Thrust Load At 100 R.P.M.	Net Price
2	1⅝	⅝	⅝	1 13/16	2⅝	1600	$23.00
3	1⅝	⅝	⅝	1 13/16	3⅛	3300	$25.00
4	2 5/16	15/16	15/16	1 13/16	4⅝	7500	$35.00
5	2 15/16	1 5/16	1	2 5/16	5⅝	12000	$47.00



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ADVANTAGES:—

Saves labor and machining time.
Eliminates oversize holes.
Saves scraping at time of assembly.
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The **BARTELT TOOL SETTING GAUGE** provides speedy, accurate setting of boring tools as well as many other tool settings and related applications.

The gauge may be had with either a micrometer or a dial indicator for exact tool setting.

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- MEAT SAWS
- METAL SLITTING SAWS, ETC.

Designed to sharpen hack saw blades, metal saw blades, circular saws, metal slitting saws and milling cutters up 5/16" face. *Write for circular.*

HOWE AND SON, INC.

HINSDALE, N. H.

Unfortunately, our bodies cannot store up salt for future use, but dispose of it promptly thru the kidneys. So if we are to maintain the salt quota, we must take a little each day. The average person working at a sedentary job obtains sufficient salt in seasoning his food. But workers on heavy jobs, especially in warm atmospheres should have extra salt to compensate for the loss thru sweating.

The use of salt tablets and tablet dispensing machines, mounted near drinking fountains or on portable water coolers is becoming increasingly popular. The tablets contain ordinary table salt, compressed under pressure to a uniform 10-grain size (about the size of an aspirin tablet).

Workers on light to medium work should have from 4 to 6 tablets daily. Medium heavy work requires 8 to 10 tablets per day. Men on heavy, hot jobs generally are benefited by 12 to 15 tablets per 8-hour day. Tablets are also available containing 70% salt and 30% dextrose for extra energy.

(Illustration—Courtesy Morton Salt Company.)

★ THE ★ WONDER CUTTER

Small enough to go in any out-of-the-way place — yet it cuts wire and rods up to ⅝" in. round (⅜-in. square) and band iron up to ⅛-in. by 2-in.

Adjustable stop for gauging the length of pieces. Hardened cutters that last indefinitely.

Get the "dope" on the lowest priced cutter out—

THE WONDER

The Federal Foundry & Supply Co.

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BURR KEYSEATERS

Mill keyways in the run or on the ends of shafting already erected—save money on alteration, erection, and repair work.

Made in 4 sizes, for hand or motor operation.

Write for Bulletins and prices.

JOHN T. BURR & SON

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THE BARNES

Motor Driven Precision Cutter Grinding Machine

For precision Grinding Formed Milling Cutters used in the manufacture of rifles, pistols, etc.

General Machinery Corp.

140 Federal St., Boston, Mass.

Telephone Liberty 4826

Freeze Order

Hundreds of thousands of tons of critical materials now frozen in idle inventories will be freed for vital war production by a regulation just issued by WPB.

The new order, Priorities Regulation No. 13, affects thousands of business concerns who possess materials worth hundreds of millions of dollars which cannot now move freely in industrial channels because of existing war regulations.

In effect, it sets up new and uniform rules governing sale of idle inventories and removes such specified sales from existing regulations which affect normal flow of materials.

No specific estimates of materials which can be salvaged in this way are available. However, the total is known to be extremely large, and in the cases of copper and copper base alloys alone, for example, it is believed that some 250,000 tons can be freed by the new step.

Limitation orders, issued by WPB in anticipation of industrial conversion to war production, and to conserve scarce materials, contain various provisions which restricted disposal of inventories frozen as a result of their terms. In some cases. certain permitted types of sale were listed in the original order. In other cases, no sale might be made without application to Washington and the specific authorization of the Director of Industry Operations. These restrictions are now replaced by the conditions established in the new regulation, which controls all sales of restricted material including those sold in liquidation and bankruptcy proceedings.

An example of the simplified proce-

KEEP IT FLOWING....Keeps 'em Going
—and keeping 'em going has never been more important than it is today. Gits Oil Cups and Lubricating Devices, of every description, are answering the Call of the Colors with a proved-in-service reputation established thru more than 30 years of service to industry. Catalog No. 60, gives you 172 pages of answers to lubricating problems.
GITS BROS. MFG. CO.
1860 South Kilbourn Ave. Chicago, Ill.
30 years of oil cup experience

New Silver King One Ton Tractor Crane

Tractor Cranes of this type and design can be constructed to your specifications.

Inquire about our new Hydraulic Power Shovel for use in moving coal and other material from the stock pile to its place of use.

Write for more details

CULLMAN HUBER SALES CO.
22-13 Steinway St., Long Island City, N.Y.

dure effected by Regulation No. 13 is afforded by the case of a domestic refrigerator manufacturer who had on hand a large stock of copper tubing when prohibition of any further refrigerator production became effective. The tubing was badly needed by a firm, in the same city, which was turning out tank assemblies. By the terms of Limitation Order L-5-c, transfer of the critical material could not be made until official approval, obtainable only after application to WPB, had been secured. Now such a sale may be made without formalities of any kind.

Reserved for specific purchasers is "War Material," consisting of some 150 materials listed in Schedule "A" to the Regulation. This material now may be sold to the armed services, Maritime Commission, and certain other Government agencies. In addition, sales of War Material, as defined, may be made to persons who qualify by belonging to a class listed in Schedule "A" as being eligible to receive it.

Priorities Regulation 13, available from WPB offices, gives full details.

Cincinnati Planers in New England

The Cincinnati Planer Co., manufacturer of Hypro planers, vertical boring mills and planer type millers is serving its present and prospective customers in New England, New York State, northern New Jersey and a part of Pennsylvania direct from its Cincinnati office.

Competent sales engineers, service men and demonstrators will offer sales and service direct from the Cincinnati office to industries in the Northeast.

The only area in that section of the country where the Cincinnati Planer Co. will not sell and service direct will be the Syracuse territory where the C. H. Briggs Machine Tool Co. will represent it.

C. H. Briggs was associated for many years with Henry Prentiss & Co., Inc., Syracuse, N. Y. office.

Henry Prentiss & Co. Inc. has acted as representative of the Cincinnati Planer Co. in the Northeast since May 31 last.

Scrap

Formation of American Industries Salvage Committee, representing groups of industrial concerns working with the Conservation Division of WPB to help speed the collection of vital scrap materials, is announced by R. W. Wolcott, Chairman of the group and President, Lukens Steel Co.

Other members of the administrative committee directing the nation - wide two million dollar campaign are:—Charles R. Hook, Pres., American Rolling Mill Co., Vice Chairman; R. S. Wilson, Rubber Manufacturers Ass'n; and O. E. Mount, Steel Founder's Society of America.

Work of the committee, backing up a broad and comprehensive advertising program, will be two-fold:—(1) to reach every manufacturing and business firm in the nation to impress absolute need of getting every possible ton of scrap to the production line; and, (2) to get business men cooperating with local WPB salvage committees already set up in 12,000 communities.

Activities of the committee will be closely coordinated with the present intensified WPB scrap collection drive, according to Wolcott. In this connection, the committee is underwriting the cost of an extensive national advertising campaign approved by WPB, with a number of major industries underwriting the costs.

Advertising in publications and on the air, focuses public attention upon the need for iron and steel scrap, nonferrous metals, rags, burlap, rubber, tin cans (in some localities), and waste cooking fats.

Kum-Kleen

INSPECTION STICKERS
REJECTION STICKERS
IDENTIFICATION STICKERS
INSTRUCTION STICKERS

AMAZING NEW STICKER STOPS ERRORS

Simply press on—no moisture necessary—adhere to any smooth surface—never pop off, even when exposed to intense heat or cold—yet peeled off easily in one piece without leaving a mark. Won't pull off like string tags, fall off like wet stickers, rub off like chalk marks, pull out like pins, increase costs like metal tags. These new Kum-Kleen Dry Stickers are speeding production, eliminating errors, providing greater economy. Available in assorted sizes, shapes and colors—blank or printed.

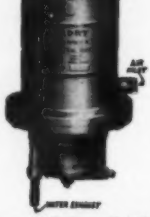
Write today for free samples—make your own on-the-job test, or consult our Engineering Advisory Service.

WRITE FOR SAMPLE TODAY

Avery Adhesive Dept. HB-8
451 E. 3rd St., Los Angeles

Kum-Kleen STICKERS

WATER removed from AIRLINES AUTOMATICALLY WITH THE MURPHY SEPARATOR



Sizes ½" to 4" Pipe

Literature and Prices on request.

RESULTS — — — — GUARANTEED
NO ABSORBENTS — NO CHEMICALS

JAS. A. MURPHY & CO.
HAMILTON, OHIO

FOR REMOVING BROKEN TAPS

Quickly—
Insert WALTON Tap Extractor and back out broken piece. No annealing—no drilling.

Easily—
Tap Extractor and Tap Wrench are only tools needed.

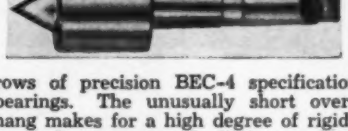
Safely—
Threads are not damaged. Not necessary to tap oversize after broken tap is removed.

Folder 131 gives complete details.

The Walton Co.
95 ALLYN STREET, HARTFORD, CONN.

"Quadro" Precision Live Center

A precision live center to be known as the "Quadro" is now being marketed by the Fisher Tool Co., 226 Lafayette St., New York, N. Y. An outstanding feature is the use of four



rows of precision BEC-4 specification bearings. The unusually short overhang makes for a high degree of rigidity and accuracy and eliminates chatter. A positive felt-seal is provided to exclude dirt and retain lubrication. The hardened and ground cone has a point accurate to 0.0002 inch.

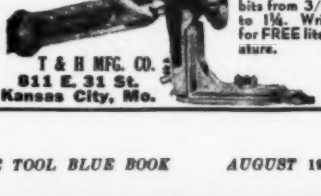
The Quadro is available in four sizes with Morse taper No. 2, 3, 4, and 5. Special centers can be made to order.

Porous Iron Bearings

Designed as an improvement on porous bronze types, Keystone Carbon Co., St. Marys, Pa., announces production of Selflube, porous iron bearings. Outstanding among advantages claimed for the new product are malleability, strength to withstand clinching operations and greater loads. Tests by the firm are said to have shown performance equal, if not, superior to solid and porous bronze bearings. Wide range of applications is claimed in fractional hp motors, phonograph mechanisms, electric fans, sweepers, sewing machines, business machines, etc.

NEW LOW COST
DRILL GRINDER

Anyone can do expert drill grinding with this simple-to-use drill grinding attachment—fits on any bench grinder—saves buying new twist drills—saves time and materials that dull bits waste. Grinds bits from 3/16 to 1¼. Write for **FREE** literature.



T & H MFG. CO.
811 E. 31 St.
Kansas City, Mo.

Plants for Sub Contract Work

HERE are additional plants with machine tool capacity available for subcontract work. Code numbers are used in lieu of names for obvious reasons. Addresses are at all times available for Goverment Officials, prime contractors and responsible manufacturers.

Address all communications to Subcontract Dept., Hitchcock Publishing Co., 508 S. Dearborn St., Chicago, Ill. (Phone HARrison 6040).

If you have any idle tools in your plant, send a description of your plant and list of tools for listing. It is a patriotic duty for every plant to respond to Donald Nelson's appeal for additional subcontract capacity. There are no charges or obligations involved in connection with listing your subcontract facilities in The BLUE BOOK. It is our gratuitous contribution to help speed the American All-Out Victory Program:

H-44—Small manufacturing plant in Eastern Wisconsin has a 20" lathe; planer 24" x 96"; Miller 11 x 38"; 36" Shear (High Speed); Drill Press ½"; 10" x 36" Norton Grinder; available for full time work, also gray iron foundry in connection.

H-43—Extensive tube fabrication and sheet metal facilities in Chicago district are available for subcontract work. Plant is equipped to handle any bending, burring, flanging, forming, threading or tapping of tubing or rods. Fully equipped for such tubing products as primer tubes, shell bands, tubular gun mounts, hydraulic and pneumatic lines, retractable landing gears, etc. Sheet metal equipment includes a complete line of brakes, presses, shears, welders, etc., handling from 10 to 24-gauge stock, for such products as ammunition boxes, airplane runways, ration boxes, tank parts, chests, machine tool tenders, work benches, tote boxes, shelf boxes, etc.

H-42—Mnfr. of precision screw machine and lathe products in New York area, sizes from ¾ to 6" length and up to ½" diameter wants additional subcontract work. Is accustomed to working to tolerances of plus and minus .0005". Equipment includes 15 semi-automatic vertical Swiss-type chucking machines (1 year old); 10" Atlas bench lathe; Sloan & Chace bench lathe; Seneca Falls 18" lathe; B & S No. 0 miller; Burke No. 4 milling machine; 10 Delta 10" drill presses; Delta abrasive cutoff machine; optical comparator and other standard testing equipment; standard tools and attachments for machines listed. Equipment in excellent condition.

H-41—Auto Parts Company in Mississippi has a small precision machine shop suitable for subcontract work on jigs, fixtures and gages or other close tolerance parts. Equipment includes Norton external grinder 18x72"; internal grinder 18" spindle; surface grinder 10x72"; 2½ universal milling machine with vertical attachment and dividing head; 3 lathes 11 to 18"; 2 portable boring bars 2½ to 7" and 7 to 24"; 24" drill press.

H-40—Paper Converter Firm in New York has 2 Seybold straight cutting machines; Sheridan die cutter; Bliss drop press; 2 Kidder slitters available for war production subcontract work.

H-39—Kansas producer of radial aircraft engines is anxious to convert fully to war production. At present producing ammunition tools and doing glider work. Partial list of machines available includes:—cylinder hone machine; automatic piston machine; Heald cylinder grinder; cylinder fin machine; LeBlond No. 1 Multicut; LeBlond profiling machine; LeBlond engine lathe. Complete listing available for prime contractor.

H-38—Small Ohio job shop offers 120 hours' capacity per week on 14"x6' lathe; 10"x3' lathe; pedestal drill press, 1" capacity. Recently finished order for milling machine arbors for an armament corporation and accustomed to doing accurate work.

H-36—Rhode Island engineering firm specializing on tools, dies, jigs, gages and special equipment has considerable capacity available for lathe, shaper, milling machine and grinder work.

STOP WORRYING

It is easy to solve hard lubricating problems

USE

MOTOR MICA

REG. U. S. PAT. OFF.

IT SPEAKS FOR ITSELF

Packed in 5-10-25 lb. containers

also 1 lb. trial pkg's.

made and sold direct by the

SCIENTIFIC LUBRICANTS COMPANY

3460-62 N. CLARK ST., CHICAGO, ILL.

TAPS

HIGH SPEED STEEL

Cut Thread

IMMEDIATE DELIVERY

Sizes in stock

High Speed Plug Taps

6-32 Machine Screw Taps
8-32 Machine Screw Taps
10-24 Machine Screw Taps
10-32 Machine Screw Taps
12-24 Machine Screw Taps
1/4-20 Hand Taps
1/4-28 Hand Taps
5/16-18 Hand Taps
5/16-24 Hand Taps
3/8-24 Hand Taps
7/16-14 Hand Taps
1/2-13 Hand Taps
9/16-12 Hand Taps
5/8-11 Hand Taps
3/4-10 Hand Taps
3/4-16 Hand Taps
7/8-14 Hand Taps
7/8-18 Hand Taps
1"-14 Hand Taps

High Speed Spiral Point (GUN) Taps

6-32 Spiral Point Taps
8-32 Spiral Point Taps
10-24 Spiral Point Taps
10-32 Spiral Point Taps
12-24 Spiral Point Taps
1/4-20 Spiral Point Taps
5/16-18 Spiral Point Taps
5/16-24 Spiral Point Taps
3/8-24 Spiral Point Taps
3/8-16 Spiral Point Taps
7/16-14 Spiral Point Taps
1/2-13 Spiral Point Taps
1/2-20 Spiral Point Taps
5/8-11 Spiral Point Taps
3/4-10 Spiral Point Taps

(Standard Catalog List Prices and Standard Discounts in Effect ....)

WESTERN TOOL CO.

619 W. Randolph St. - Chicago, Ill.

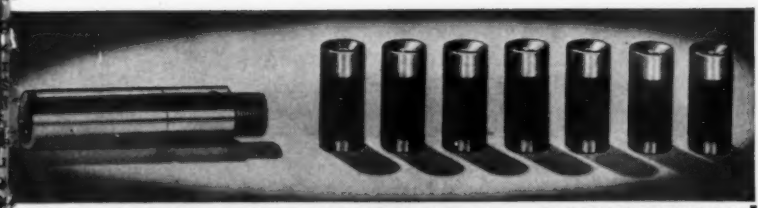
H-32—New York City firm has been doing subcontract work but has additional capacity. Floor space 12,000 sf exclusive of warehouse. Personnel:—4 toolmakers; 4 expert mechanics; 8 lathe operators and all-around men; 6 turret operators; 6 bench men; 2 helpers; 25 female assemblers accustomed to light dexterous work. Equipment includes:—Prentice geared heavy duty lathe 18"x8'; Monarch quick change lathe 15"x6'; 2 Seneca Falls loose change gear lathes. 12"x5' with metric thread conversion attachments; 3 Logan precision lathes 10"x3' (new); South Bend loose change gear lathe 14"x6'; (all lathes fitted with turret tailstock attachments and 4-way tool posts, also draw-in chucks and collets); 2 Morey 2G turret lathes (new) 1" bar feed and collet capacity; LeBlond plain milling machine; US Tool No. 1 production; Ican 20" x 8'; Prentice 18" x 10'; Pond 26"x20'; Flather 28"x20'; Draper with Hisey-Wolf grinding attachment 14"x20'; Shaft straightening lathe and 2 hydraulic presses; Kearney & Trecker No. 1 plain miller with vertical attachment; Cincinnati No. 2 ditto; Keyway miller with 12x12"x6' table; Flather planer 48" between uprights, 10' platen 2 heads; Pond planer, 60" between uprights. 16' platen 2 heads; Flather planer, 36" between uprights, 14' platen, 2 heads; American planer, 30" between uprights, 8' platen, 1 head; Defiance 50-ton upright power press; Smith & Mills 20", Steptoe 16" and Lodge & Davis 16" shaper; 30" American and 24" Gisholt turret lathes; Jones & Lamson 3x36" cast iron and 2-2"x24" steel turret lathes.

K-13—Chicago plant making filtering equipment for beverage field. 35 years' old. Excellent financial standing. Open shop. Owns 2-story building. Has a variety of equipment:—1-48" Bridgeport vertical boring mill; 4 engine lathes from 18 to 24" swing; 1 No. 2 Brown & Sharpe Milling machine; 1 Shaper; 3 Fox lathes; 4 drill presses, etc. Highly reliable and boasts of fairly close tolerances.

K-12—Illinois plant known nationally in making of large refrigeration compressor units. Commercial tolerances only. Would like something to include fabricating. Ample space—5 engine lathes from 18 to 24" swing; 2 radial drills; 1-24" wide planer; 1 shaper; 1 Lucas horizontal boring bar, 2½"; 2 drill presses; 1 milling machine; a large assortment of secondary equipment such as power saws, pipe threaders, bending machines, both **oxy and** arc welders, etc.

K-9—Illinois manufacturer well known in railway supply field. Excellent assembly facilities. 4 engine lathes from 14" to 18" swing; 4 hand screw machines; 6 millers; 1 radial drill, 3½'; 12 drill presses; one shaper; 2 bench lathes and miscellaneous other equipment. Anxious for considerable subcontract work.

K-8—A Chicago manufacturer, long makers of machinery for construction trades, has excellent plant with good machine facilities for a lot of subcontract work. 7 engine lathes from 14" to 48" swing; 2 turret lathes of 21" swing; 2 millers; 5 shapers; 2 boring mills (42" vertical table and 2½" bar horizontal), 5 grinders including external and internal. Good management.



NEW—DIFFERENT—ADJUSTABLE—ECONOMICAL!

Green MASTER FEED FINGERS

FOR AUTOMATIC SCREW MACHINES

cover the entire range of your screw machines for a few inserts.

NO SEARCHING FOR FINGERS AND PADS

A real production speed-up with new and exclusive features. Solid, long-wear, break-proof construction. No moving parts, no springs. Adjustable by simply selecting insert nearest stock size, inserting into finger, applying tension ring and placing on machine. Soft composition contacts prevent marring of stock . . . . Order now. Satisfaction guaranteed.

Feed all shapes
Easy to load
Hold at high speed
Greater grip area
No rebound
Can't mar stock

Send for Bulletin giving details.

GREEN MFG. CO.
P. O. Box 704
ROCKFORD, ILLINOIS

STYLE A - for general boring

STYLE B - for facing and bottoming

STYLE C - for internal threading

Here's a tip

that will help your production

For speed, economy, accuracy, and efficiency, use Bokum Boring, and Internal Threading Precision Tools.

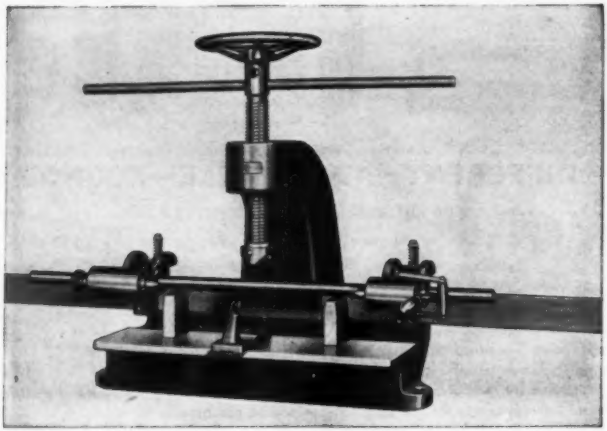
Because the material removed is not taken squarely at right angles but at a favorable slant, and because the greatest cutting force is always directed towards the largest cross section of the cutting tool, the Bokum Tool can stand more feed than can the ordinary boring tools — and it will produce a smooth bore, true to size. The free cutting edge remains constant, unchanged by resharpening.

Send for Catalog H-139.

For Carbide tipped-tools ask for Catalog H 1-398

BOKUM TOOL CO.
49 W. HANCOCK AVE. DETROIT, MICH.

No. 576 General Hand Screw Straightening Press



The illustration shows a No. 5 General Hand Screw Straightening Press equipped with a No. 76 Lock Lever Center Type Shaft Straightening Attachment, made by General Machinery Co., 6438 Farnsworth St., Detroit. Altho the outfit shown is intended for smaller jobs, straightening attachments of this type are available for straightening practically any kind of shaft under a power press. Without removing shaft from attachment, operator can revolve shaft for test purposes and move it in either direction to bring the bend under press ram. Work is not removed from centers (or rollers) until straightening is completed.

The attachment is mounted on press table so that center line of part to be straightened is directly under ram. Base supports track for carriage. It also forms a table on which bending blocks are placed in any desired position and there is ample space for an indicator on the stand shown.

The two carriage heads are held the required distance apart by a spacer bar and this distance may be adjusted to suit different lengths of work. Each carriage head has ball bearing rollers for easy traverse.

The two swinging arms supported by the carriage heads, are held to a gauging position against positive stops by springs around studs in each head. Each swinging arm moves independently. When press ram forces work down upon bending blocks, the work pulls the swinging arms down with it by compressing the springs. When ram pressure is released, springs return piece to gauging position.

In the lock lever center type attachments, both swinging arms are provided with large sleeves in thru holes having full length of bearing in each arm at all times. These sleeves are provided with removable centers having short Morse tapers. A single movement of lever advances right hand center, locking it formed and engaging work. Left hand center and its sleeve are pushed back against a compression spring. A screw permits easy adjustment of this spring pressure when setting up job. Spring also takes care of ordinary variations in length of parts. After straightening and gauging, another single movement of lever removes centers from work. (Center movement is 1½"). Should work break during straightening, the centers engaging both ends prevent pieces from flying.

New, Accurate Tailstock Turret

Ideal for engine and bench lathes —for special runs, small runs that come through regularly, or for relieving turret lathes. Holds six tools and comes complete with tapered arbor that fits in tailstock. Tool holes are bored, after arbor is fitted, to insure accurate centering of tools. Saves time in tool changing and chucking. Quickly pays for itself. Recommended by many users. Immediate delivery. Order from your dealer or write for descriptive circular and name of nearest dealer.

Model "A"—2½" dia. with 6 bored ⅞" holes No. 1 or No. 2 Morse Taper Arbor..... **$18.95**

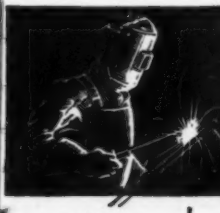
Model "B"—5" dia. with 6 bored ⅞" holes with No. 3 Morse Taper Arbor..... **$32.95**

F. O. B. Chicago

E & N Manufacturing Company

3321-23 Montrose Ave., Chicago, Ill.

The "ENCO"



★ *welding economy*

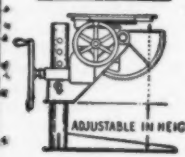
STARTS

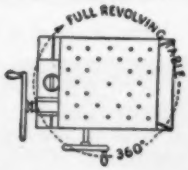
with efficient handling of welding assemblies

AFTER a welding assembly is once fastened to the table of a C-F Welding Positioner, the welder, without any other help, can tilt the work to any angle from horizontal to 135° beyond horizontal and he can turn it to any degree within a complete circle. This means better welds all "down hand," safer handling and faster production. Sizes from 1,200 to 14,000 lbs. capacity are described in our booklet WP 22.

Write for your copy. It tells the complete story.

CULLEN-FRIESTEDT CO., 1321 S. Kilbourn Ave., Chicago, Illinois





IT WILL PAY YOU TO INVESTIGATE OUR PRECISION TOOLS!

M & L No. 1 Precision Tapper

Efficient—

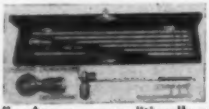
Quick—

Taps guided by precision leads.

Used by many large U. S. manufacturers.

Precision tapping on a production basis. Class 3 and 4 specifications easily met. A high quality machine with 4 speeds, 95 to 395 RPM and dial indicator for bottom tapping. Ball bearings throughout. Equipped with coolant pump system. No skilled operators necessary—sensitive touch—minimizes 'rejects'.

INTERNATIONAL INSIDE MICROMETERS



HIGHEST ACCURACY AND FINEST WORKMANSHIP
Available in 2 sets: 1½"-6" and 1½"-12" including case and handle. Accuracy unconditionally guaranteed.

M & L POSITIVE OFFSET BORING HEAD 0-15".
New **"HANDY KNURLER"**, used like pair of pliers.
BRAND TELESCOPE GAGES ½" - 2⅛" capacity.

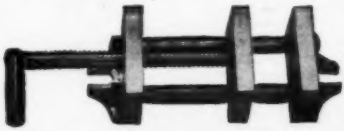
Write for complete information to:

BRAND TOOL & SUPPLY CO.
formerly Pacific Tool & Supply Co.
344 N. Vermont Ave. Los Angeles, Cal.

In the roller V type attachment, the swinging arms are provided with rollers so placed as to form a V to carry round parts that have not been centered. Roller positions are made to suit diameter of part to be straightened.

The No. 5 hand press shown has an opening of 12"; stroke 9"; throat 5"; table length 30" and table width of 8". Screw diameter is 2⅜" with 3 pitch Acme thread. Net weight is 470 lbs—with attachment as shown, 620 lbs. Track length of attachment is 85" for standard 36" maximum between centers or rollers. (24. 48 and 60" maximum lengths are also available).

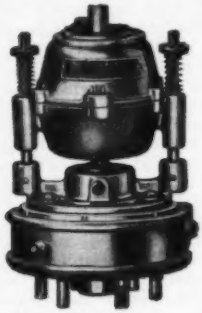
All Steel Drill Press Vise



Here is a simple, inexpensive and practical all steel drill press vise to meet all shop conditions. In all 3 working positions it lies flat on the face plate. Square thread operates against a bronze thrust bushing. The use of two guide bars permits operator to drill completely thru the work without injury to the vise. It is especially adapted to small assembly work and for holding small pieces for machining, filing, etc., during bench operations. Made in two sizes, the model illustrated has 5½" opening, with ears to fasten to face plate. It is made also with 3" opening, without ears, otherwise the same sturdy construction, by the Patterson-Ballagh Corp., 1900 E. 65th St., Los Angeles, Cal.

Zinc in War

A new large size 4-page bulletin presents pictorially, many of the ways in which zinc is contributing effectively to our war effort. Some of these include:—zinc in paint, in metal spraying, in optical glass, in stamping dies, in army cars and tanks, fuse plugs, etc. Copies are available from The New Jersey Zinc Co., 160 Front St., New York City.



Above: Drive Unit of Tapping Head with a gear case assembly attached.

At Right: Drive Unit for Drilling. All gear cases are interchangeable on the two heads.

GET MORE PRODUCTION CAPACITY
without more machines

YOU CAN DO IT WITH *Ettco-Emrick*
MULTIPLE TAPPING AND DRILLING HEADS

These heads will multiply the drilling capacity of your drill presses many times—and give you high tapping capacity as well. Heads are attachable in a few minutes without altering presses in any way. **QUILL CLAMPS** are supplied to assure rigid mounting on any press.

BULLETIN No. 3 gives full details about this production-boosting system of interchangeable heads. Copy mailed on request.

ETTCO TOOL CO., Inc.
596 Johnson Ave., Brooklyn, N. Y.
Detroit, • Chicago

MAKERS OF *Ettco-Emrick* DRILL CHUCKS • TAP CHUCKS • TAPPING ATTACHMENTS
MULTIPLE TAPPING AND DRILLING HEADS • TAPPING MACHINES

How Small Quantity Runs can be held without fixtures

Where runs are too small to warrant making jigs and fixtures, today's production demands are for Knu-Vise Toggle Clamps and Quick-Action Pliers.

Illustrated here is a case where production was carried on without loss of time; no necessity to wait for fixtures. The two large C-Clamps served as temporary fixtures while the large throated pliers held the work in place during drilling operations.

C-Clamps are available in 5", 6", and 10" sizes, and lend themselves to a range of 15 to 20 different setups. The pliers have 3", 4", and 6" throats.

Let us help you with your clamping problems.

KNU-VISE INCORPORATED
1334 PLUM ST., DETROIT, MICH.
4328 SAN FERNANDO RD. GLENDALE, CALIF.

"How Long Will My Tires Last?"

By W. F. Schaphorst, M. E.

Here is one of the most important questions of the day owing to the critical rubber situation. Every car and truck owner not only should ask himself the question but he should **do something about it** in an effort to help carry himself and our nation well into the zone of rubber safety.

The chart will assist materially in deciding on the number of miles you can drive safely per week on your present tires after determining their mileage expectancy.

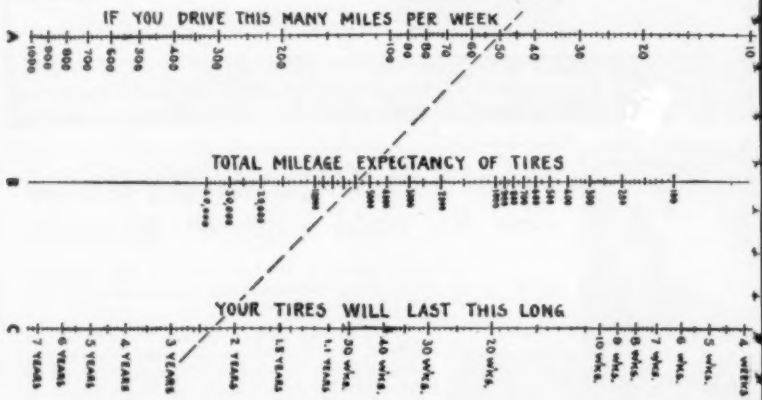
If you do not know or cannot estimate the expectancy of the tires yourself, go to your car or tire dealer and have him do it for you. Then apply this chart.

For example, let us say that your tires are still good for 6,000 miles, and you figure that by being conservative you can get along by driving 50 miles per week. How long will the tires last?

The dotted line drawn across the chart shows how easily it is done. As will be noted, the dotted line passes thru the 50 in column A and thru the 6,000 in column B. The intersection with column C then tells you that your tires will last 2.3 years.

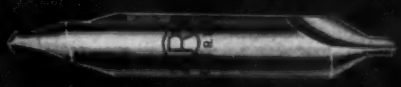
If you want the tires to last longer than that, cut down still more on the mileage per week, if you can.

Tire manufacturers are telling us over the radio and in advertisements how to make tires do their best as regards wear. This chart will tell you how much to use them so as to obtain maximum service.



COMBINATION CENTER DRILL

THESE ® MARK



Special Alloy and High Speed Steel. Ground with Radial Relief. Will give more production at less cost. Write for catalog.

CIRCULAR TOOL CO., INC.
767 ALLENS AVE. - PROVIDENCE, R.I.

Chicago - Philadelphia - New York - Dayton - Cleveland - Syracuse - Indianapolis - Detroit - St. Louis

KUTKOST

KUTKOST is supplied in three grades:

GRADE V : For heavy roughing on all types of high tensile strength materials (1/32" to 1/8" feed)
Rockwell "C" hardness 61-64

GRADE X : For medium roughing and semi finish on all high tensile strength materials (.010" to .032" feed)
Rockwell "C" hardness 65-67

GRADE XV : For finishing cuts on all types of materials. Also roughing and semi finish on low tensile strength materials such as bakelite, brass, bronze, aluminum, copper, etc.
Rockwell "C" hardness 68-70

Speed at which to operate "KUTKOST": Generally we recommend the following speed increase over high speed steel:

Low tensile strength materials: 100% to 300%

Cast Iron and Semi Steel: 100% to 300%—Steel Castings: 50 to 200%

Tough alloy Steels: 100% to 400%—Stainless & Manganese Steels: 100 to 500%. KUTKOST is much tougher than Carbide Tools and can take much heavier and severer cuts. It is displacing carbide tools on the tougher jobs.

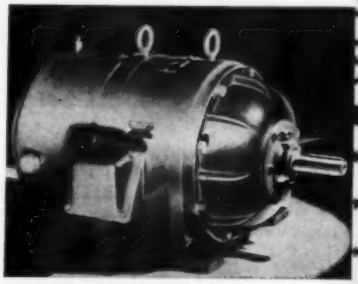
GENERAL TOOL AND DIE CORP.
555 PROSPECT ST., EAST ORANGE, N. J.

Motors for Magnesium Dust Locations

A new line of polyphase induction motors in sizes from 1 to 20 hp, NEMA frames 203 to 326 inclusive, suitable for use under magnesium dust conditions is announced by the General Electric Co., Schenectady, N. Y. Labeled as suitable for Class II, Group E locations, the new line should find extensive use in the rapidly growing number of plants handling magnesium, particularly where fine magnesium dust is encountered.

The new line has been developed to meet a need brought about by the extensive use of magnesium and aluminum in war production. In many cases, motors are being subjected to these metals in the form of fine powder, as used in incendiary bombs and for other military purposes, or from castings during grinding or polishing operations. Since these dusts are extremely combustible, they present a hazard classified by the National Electrical Code as Class II, Group E, requiring special motors and control.

The design of the new line of motors is based on a series of tests recently initiated by G.E. at the Underwriters' Laboratories, Inc., in which a sample 15-hp, 1800-rpm motor was subjected to a cloud of fine magnesium dust while operating under heating and cooling cycles simulating several years' operation in an industrial plant. Careful examinations of the motor afterwards indicated that it had successfully withstood all tests.



These motors are totally enclosed, with a nonventilated construction in the smaller ratings and a fan-cooled construction above 2 hp. Simple cast-iron end shields, stator frames, and fan housings provide dust-tightness without complicating assembly or disassembly.

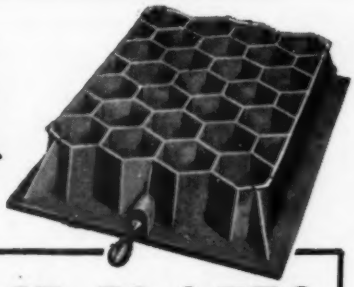
Other features of the new line include nonsparking bronze external fans, relatively straight and smooth external ventilating passages (for fan-cooled motors) to facilitate cleaning, permanently sealed-in leads, and a rotating labyrinth seal at the shaft opening.

WIRE and FIBRE ROPE
Make it Last with
Ensign 384
ROPE PRESERVER
A Self-Spreading and highly tenacious LIQUID that Penetrates every Fibre and Strand
INTERNAL LUBRICATION
EXTERNAL LUBRICATION
Penetrates, waterproofs, fumeproofs and lubricates internal wires, strands and core.
Prevents internal friction, crystallization—
Hence minimizes wear and breakage, insuring safe operation.
Impregnated ropes retain flexibility—no kinking—and tensile strength increased.
Ask us about
371 BELT PRESERVER
395 METAL PRESERVER
We Welcome Inquiries
ENSIGN PRODUCTS COMPANY
3328 E. 70TH STREET CLEVELAND, OHIO
SINCE 1897

Correction

An interesting new type of portable magnetic chuck and demagnetizer was described on page 304 of the July issue. It is being introduced by Anderson & Brown Sales Agency, 2036 East 22d St., Cleveland, Ohio. Inadvertently, the address was given as "23d St." and we offer our apologies to the readers and to the Anderson & Brown Sales Agency.

LOOK AT
the BASE
when you
look at



SURFACE PLATES
MADE OF MEEHANITE METAL

Every feature of these Meehanite Metal Surface Plates adds up to better, more accurate checking surfaces. They weigh up to one-third more than any of the popular plates; this added weight is evenly distributed throughout the plate by use of our HONEYCOMB PATTERN.

SIZES	APPROX. WEIGHT	TOLERANCE	NET PRICE
9 x 12	40 lbs.	.0001"	$ 35.00
12 x 18	95 lbs.	.0001"	68.00
18 x 24	200 lbs.	.0001"	133.00
18 x 36	310 lbs.	.0002"	174.00
20 x 30	325 lbs.	.00025"	190.50
24 x 36	475 lbs.	.00025"	275.00
30 x 36	510 lbs.	.00025"	345.00
30 x 60	1425 lbs.	.00025"	596.50
31 x 78	2100 lbs.	.001"	827.00

OTHER SIZES TO SPECIFICATION. ANGLE PLATES AND STRAIGHT EDGES ALSO AVAILABLE
Good deliveries on most sizes—write for folder

ACME TOOL COMPANY
200 CHURCH ST., NEW YORK

Conversion

The steel industry has done an increasingly effective job producing steel plates for war production, A. I. Henderson, WPB Director of Materials, declared in releasing June shipment figures of 1,050,962 net tons. This is the second successive month plate output topped 1,000,000 tons and continues the month by month increase started last fall. May shipments were 1,012,194 tons.

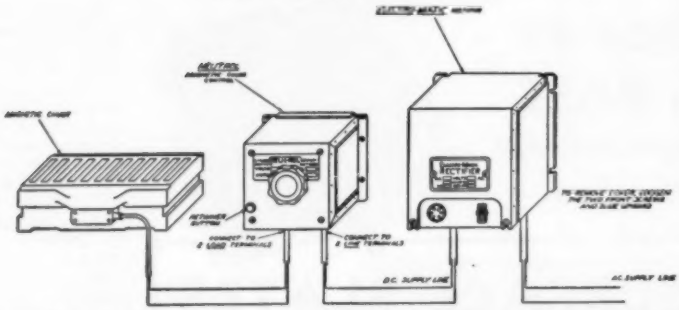
Greatest factor in the increase, Mr. Henderson pointed out, has been the extremely difficult problem of converting continuous strip mills to plate production. Strip mills were designed to produce large quantities of steel sheet, mostly for the automotive industry. The problems involved in rolling and handling plates 1" thick as compared to sheets 1/25" thick are obvious. Heavier equipment is needed all along the line. Less obvious but actually more complex has been the problem of additional space to house this heavier equipment and to handle heavy plate.

How successful this effort has been is evidenced by June output of 489,704 tons of plates from strip mills that were producing none a few months ago. May production was 425,211 tons.

This is the first time since the program opened that plate production from strip mills has exceeded that from sheared mills. These latter, regular sources of plates, turned out 438,000 tons in June.

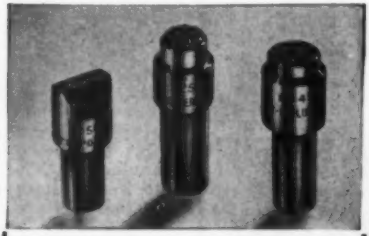
Stronger cranes to move plates and heavier shears to cut them have been necessary in all the converted mills.

Electro-Matic Rectifiers



A complete new line of sturdy electronic rectifiers, embracing 42 models and a capacity range of from 125 to 3000 watts is offered by Electro-Matic Products Co., 2235 N. Knox Ave., Chicago, Ill., manufacturers of the Neu-T-Rol control for magnetic chucks.

Designed for heavy duty industrial service, the P and R series rectifers (of 1000 watts and larger capacity) have a built-in Electro-Matic Time Delay Switch, energized by the d-c output. This extends tube life and prevents burnouts as it prevents throwing the load on the tubes until they are properly warmed-up. The makers assert that momentary voltage failures will not trip the time delay and cause it to recycle. Control is direct from the temperature of the rectifying tube filaments, and the time delay is synchronized with the rectifying tubes.



MEYERS *"Dia-Brasive"*

MULTIPLE DIAMOND POINT DRESSERS

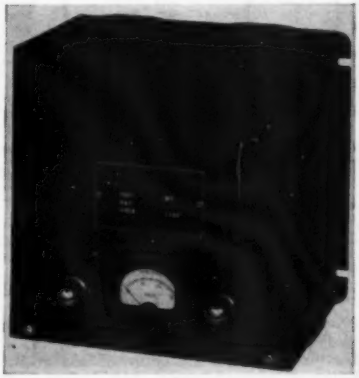
for Efficient, Economical Service

With "Dia-Brasive" Multiple Point Dressers, numerous sharp points are always exposed to the work, or face of wheel. New points can be secured by turning dresser a quarter or half turn. The small diamonds are more reasonable in price, and remain sharp longer, than large stones. We also make a complete line of single point diamond dressing tools. Special dressers built to order.

Write for new literature.

W. F. MEYERS CO., INC.

Dept. BB, BEDFORD, IND., U.S.A.



The L and M series rectifiers, (250 and 500 watts capacity) can be furnished with the time delay switch at a reasonable extra cost, eliminating the most frequent tube hazard.

COLMONOY SAVES VITAL METALS

The Pug Knives shown above tell a graphic story of the amazing wear resisting qualities of COLMONOY hard-surfacing alloys and overlay metals.

1. New, 24 lb. pug knife, made of high alloy steel.
2. and 3. Same type, after only 3 months of service. Worn beyond efficient operation, with several pounds of high alloy steel worn away.
4. and 5. Same type. Each blade coated with 1½ lbs. of COLMONOY. In constant use for over a year, and still going strong.

COLMONOY is playing a vital part in the machine tool industry. Use it on parts subject to great wear — lathe centers, dogs, chip breakers, wire straightening shoes, thrust bearings, screw machine fingers and cams, grinder feed fingers, forming and drawing edges, etc.

Write for full information.

WALL-COLMONOY CORP.

720 Fisher Bldg. **DETROIT, MICH.**

BRANCH OFFICES AT NEW YORK CITY, BLASDELL, N.Y., CHICAGO, TULSA, WHITTIER, CALIFORNIA. OTHER BRANCHES IN CANADA.

SELLERS No. 6-G DRILL GRINDER

WM. SELLERS & CO., INCORPORATED, 1616 Hamilton St., PHILADELPHIA, PA.

Sellers

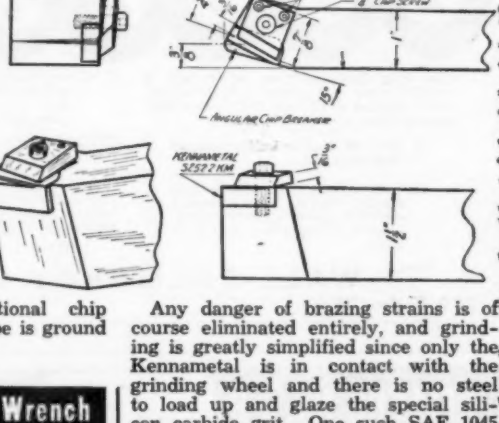
A modern trend is to build rectifiers and magnetic chuck control units right into the bases of surface grinders. The accompanying sketch shows how simple it is to hook-up the rectifier, Neu-T-Rol and magnetic chuck.

Bulletin No. 61 gives complete details.

Clamped-on Carbide Tool Tips

Shops making up their own carbide cutting tools can greatly simplify the job and at the same time be assured of strain-free tools, by using a clamped-on tool.

A simple design which has been found very satisfactory is shown. A tool shank is milled out, care being taken to get as flat a surface under the tip as possible, and a simple clamp attached. The SAE 1045 clamp is not used to break the chips as it would soon be eroded to destruction. Instead, a conventional chip breaker of angular shelf type is ground into the Kennametal tip.



Any danger of brazing strains is of course eliminated entirely, and grinding is greatly simplified since only the Kennametal is in contact with the grinding wheel and there is no steel to load up and glaze the special silicon carbide grit. One such SAE 1045 shank will serve to mount about 4 successive tips before it becomes cut and battered badly, and a harder steel would probably last even longer.

As the tip is reground, it is moved forward and out under the clamp, shims being placed behind it. When the tip becomes too small for service in this tool, frequently it can be brazed into a smaller shank for lighter turning operations or boring.

The freedom from strains due to unequal expansion of tip and shank makes a great difference in tool life, particularly on "home made" tools which are frequently made under widely varying conditions. It is reported that in one plant, the use of clamped-on Kennametal tips made it possible to operate for months without a single case of serious tip breakage.

Mechanics' Tool Catalog

A new catalog on Mechanics' Tools describes and lists more than 500 dif-

Two Valuable
WELDING BOOKS

Arc Welding Handbook

This new sixth edition of "Procedure Handbook of Arc Welding Design and Practice" contains up-to-date facts about all aspects of arc welding. Recognized as a complete, authentic reference work on welding — covers welding methods and equipment, technique, procedures, speeds and costs, weld metal, weldability, actual applications, etc.

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This handy, 138 page book, "Simple Blueprint Reading with Special Reference to Welding" leads the reader step by step from the fundamentals of the subject right up to more complex drawings. Emphasizes symbols standardized by the American Welding Society. Only 50c postpaid.

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Mail your order and check to

HITCHCOCK PUBLISHING CO.

508 So. Dearborn St., Chicago, Ill.

ferent types and sizes of punches, chisels, drills, socket wrenches, etc. These tools are made by American Swiss File & Tool Co., who have specialized in Swiss Pattern Files and other precision tools for over 40 years. Copies of the new tool catalog are available from 410 Trumbill St., Elizabeth, N. J.

Cincinnati Planer Adopts Pyramid Columns

The illustration shows a pyramid column of a 72" Hypro Open Side Planer as it looks along side six-foot Ray D. Allison, Sales Manager of the Cincinnati Planer Co. The housing is 167" in height, 46½" in depth at the base and 30" at the top.

Massive pyramid housings are now standard equipment on all Cincinnati Hypro Planers, Vertical Boring Mills and Planer Type Milling Machines.

Box type housings were formerly used. It was found on introduction of Hypro models that increased strength, accuracy and improved appearance could be obtained by massive pyramid construction reinforced inside with thick vertical and horizontal walls.

After success with pyramid housings

on the larger size machines, they are now being furnished on the entire Cincinnati line.

The housing is held fast to the bed with a wide tongue and groove, dowels and bolts of large diameter.

The housing face is especially reinforced and of extra width to provide an adequate bearing for the rail and for side head saddles. Housings on close side head counterbalance weights and also rail elevating screws.

Cooley Electric Heat Treating Furnace

Due to excessive demands on commercial heat treating plants, it has become increasingly difficult for small tool and die shops, and other manufacturers lacking heat treating furnaces, to obtain this important service. To offset this disadvantage, Cooley Electric Mfg. Corp., 213 S. Senate Ave., Indianapolis, Ind., has developed a small electric muffle furnace for economical and fast heat treating of small parts, drawing or tempering small lot small parts, normalizing or annealing small parts, preheating for subsequent high-speed hardening, and for emergency repair orders where 1 or 2 small parts must be heat treated in a short time. It can also be used as auxiliary equipment to larger furnaces.

The furnace is offered in 2 sizes:—Type MH-3 has a chamber capacity 8" wide, 6" high by 14" deep, and measures 18x22x23" outside; maximum power consumption, 3400 watts. Type MH-4 has a chamber capacity 10" wide, 6" high by 18" deep, and measures 18x22x27"; maximum power consumption, 4800 watts. Operating temperatures—1750° F. for continuous operation, and 1850° F. for intermittent operation. Type MH-3 can operate on 110 or 220 volt circuits, whereas Type MH-4 is available for 230 volt circuits only.

Construction of this new furnace closely follows that of the Cooley Laboratory Muffle Furnace, for many years standard apparatus for laboratory equipment.

Furnace outer shell is of heavy gauge sheet metal interposed between cast iron end frames secured by thru rods. Elements are of the embedded type affording protection from atmospheric attack. Four interlocking rectangular elements form interior of chamber and replacement is a simple procedure.

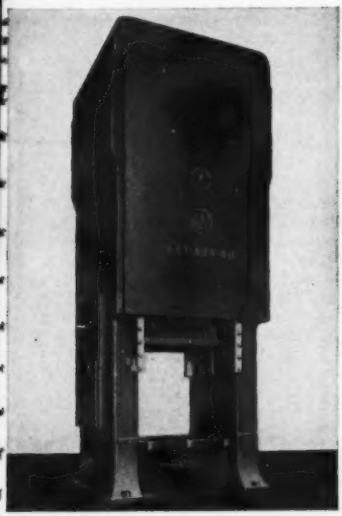
Furnaces are offered with automatic or hand control, altho use of the former is definitely recommended as productive of better work and affording protection to product and equipment.

Bliss Announces New Line

A new line of enclosed One-Point Double Action Toggle Drawing Presses has been developed by E. W. Bliss Co., 53d St. and 2d Ave., Brooklyn, N. Y. The 1-ET-500-60 press illustrated is already contributing its bit to the war effort.

This new series of presses embodies the latest ideas in the design and construction of Single Crank, Double-Action, Toggle Drawing and Deep Stamping Presses and the line is complete in its variety of standard sizes. Presses are built with practically any pressure capacity stroke or die space required.

here standard specifications do not eet special requirements, changes of roke in die space can be furnished. s with the older type toggle presses, ey are to be used in the manufacture seamless cooking utensils, kitchen re, brake drums, milk can breasts, tomobile radiators, sinks, wheelbar-ws, tubs, etc. Press frames are of e conventional 4-piece steel tie-rod nstruction which consists of a base, uprights and a crown held together 4 large steel tie-rods which are hrunk into place.



Provision can be made for conven-ently disconnecting toggle mechanism om blank holder and attaching outer lide to inner slide which is operated the usual manner, thereby convert-ng presses into single action machines nd adapting them for such blanking nd forming operations as may be ithin their capacities.

Easy conversion can also be made to riple action machines by fitting pres-ure attachments into the beds.

Tru-Cut
Tool Bits
Center Drills

● **For steels tough to machine specify Tru-Cut Tool Bits. Five toughening treatments Rockwell "C" 65-66—not brittle.**
Stocks for IMMEDIATE DELIVERY. Send for descriptive catalog and prices.

Tru-Cut
TOOL COMPANY
5820 Second Blvd. Detroit, Michigan

Presses With Sensitive Control

Bulletin No. 60 covers the line of Hydraulic Presses with sensitive pressure control, made by Hanifin Mfg. Co., 621 So. Kolmar Ave., Chicago. The line includes units from 20 to 100-tons capacity. Other items also illustrated and described are the No. 10 four-purpose tool room machine, hydraulic cylinders, hydraulic riveters, pneumatic arbor presses, pneumatic cylinders, pneumatic riveters and control valves.

"Bomb Quench" Bulletin

A new bulletin presents Bomb Quench, an extinguishing compound recommended for putting out incendiary bombs and magnesium fires. The compound is supplied in a 10-pound 60" tube which is said to be sufficient to extinguish one bomb or equivalent magnesium fire. In use, the top is removed from the tube carton and the free - flowing compound is sprinkled over the fire. Address O. H. Adams Co., 2018 E. Thomas Ave., Milwaukee, Wis., for further details.

Gilbarco Coolant Pumps

Long an accepted name in pump equipment, Gilbert & Barker, Springfield, Mass., has released specifications and data on a full line of centrifugal coolant pumps, featured, it is said, by advanced, streamlined design and practical utility advantages. Cited among these are built-in-bell, dirt and vapor proof terminal boxes; motors mounted clear of possible contact with coolant and specially seal-ringed motor-shafts said to afford positive protection against entry of foreign matter.

The seal-ringed feature, it is stated, was originally developed by the company's engineers for use on gasoline pumps. Flange Mounted Model, CE above, is said to handle liquids charged with filings and chips up to .035, without stoppage, damage or trapping of air, with controlled, splash-proof flow at all speeds and maximum discharge up to 18 gpm. Immersion Type, Model CE, delivers from a fraction of a gallon to 21 gpm free flow. The brochure is liberally illustrated and gives full data on all models made by the firm.

Cylindrical Grinding Manual

An attractive and informative new 40-page booklet—"The A B C of O.D. Grinding" has been issued by The Norton Company, Worcester, Mass.

Successively, the reader is introduced to the important parts of typical machines for this work. Selection of the grinding wheel for the job is then discussed, along with balancing and truing. Then follows consideration of the tricks and short cuts that help to increase production. Tables and performance data are given on typical jobs making up a very useful book for anybody interested in O. D. grinding.

Maintaining Morale

Executives and personnel managers who have the task of keeping efficiency and morale at a high level on war production will be interested in a new service offered by The Jaqua Co., 101-111 Garden Street, S. E., Grand Rapids, Mich. This company has written and published a series of Minute Messages, which provide brief, inspiring patriotic thoughts. The Messages are available on a weekly or biweekly schedule for attaching to checks, placing in pay envelopes or mailing to the homes of employees. Sample Minute Messages will be furnished those requesting them on their firm stationery.

Classified Section

USED AND REBUILT MACHINERY

Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of $5.00 for your name and address and a five line advertisement. For additional lines, 75c per line.

Write directly to those offering the machine for sale, **for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, Chicago, making known your wants on either new or used machinery and the publisher will gladly pass them along to the advertisers.**

FOR SALE BY

Aaron Machinery Co., - - - 176 Lafayette St., New York, N. Y.

Automatic screw machines, Cleveland, Model A, 1¼", 1", ¾", 2".
Boring mill, Bullard 36" vtl., 2 heads, 42".
Boring mill, 42" Colburn, 2 heads, m.d.
Engraving machines, Gorton, pantograph, all sizes.
Eyeletting machines, United Shoe, Model B.
Flanger, McCabe 4".
Gear cutters, 11" Gleason, bevel, (2).
Gear hobber, No. 36H G.&E., universal.
Gear hobbers, G.&E., S.&S., Barber-Colman, No. 2.
Gear shaper, Fellows No. 4.
Grinder, Churchill-Morgan internal.
Grinders, No. 55, 60, Heald internal.
Grinder, Norton, 50x28" roll. m.d.
Grinder, P. & W. 12" vertical.
Grinder, Landis, m.d. 16x52".
Grinder, Hydroil No. 52 int.
Grinder, B.&S. planer type surface.
Grinder, Norton 16"x50.
Grinders, Modern, m. d., 12x24", 12x42".
Grinder, Landis 20x72" plain cyl.
Hammers, Pettingell trip, No. 1, 3.
Index filing machines, Oliver.
Keyseaters, Baker No. 0, 2.
Lathes, 16x8, 18x8, 12x10', quick change.
Lathe, 24x10' Reed-Prentice, grd. head, m.d.
Lathe, 24"x26' Fay & Scott, 3 stsp.
Lathe, McCabe 26-48"x14'.
Lathe, 48"x26' Niles grd. face plate dr.
Lathe, 48"x12' Harrington gap, sld. bed.
Millers, Becker No. 2, 2A vert.
Miller, B.&S. No. 13B.
Miller, Becker No. 6 vert.
Miller, thread, Lees-Bradner No. 4.
Milling machine, Robottom Cam.
Pipe machines, Oster, Williams, 2", 4", 6", 8", m.d.
Planers, 24x24"x6' Whitcomb, 2 head.
Planer, 24"x24"x8' Cincinnati, 1 head.
Planer, 32x30"x8' Whitcomb, 2 head.
Planer, open side, Bedford 42"x42"x14',
Planer, 32x32"x10' Pond, 1 head.
Presses, power, all sizes and types.
Punch, Pels 6' throat, 1¾"t hru 1".
Radial drill, 5' Western, oil groove base, m.d.
Radial drills, 3' American, Mueller.
Screw machine, Gridley 3¼", 4¼", single spindle.
Shear, beam Pels No. 14.
Shear, No. 407 Niagara ring & circle, ¼" cap.
Turret lathes, Gisholt, 21".
Welders, 200-300 amp. arc.
Hydraulic pumps, presses, accumulators.
200 spindles of single and mult. spindle drill presses.

Globe Machinery Co.

602 W. Lake St., - - - Chicago, Ill.

Boring Mill: Niles 48" vertical car wheel boring & facing machine.
Broach, La Pointe No. 3 arranged for motor drive.
Drill, American radial, 3' table type.
Drill, Universal radial 4'.
Drill, Niles, rail, 6 spindle, s.p.d., 96" table, No. 5 MT.
Gun Barrel Drills: 1 Pratt & Whitney & 5 Baush, 2 spindle, horiz. 13/16" cap., size, 9½' bed, 6½" swing.
Grinders, Norton 10"x24" cyl., m. d., hand feed.
Grinder, Fitchburg 12"x36" cyl., hand feed.
Hammer, Bradley 60 lb. Helve.
Lathe, Fitchburg low swing, 36"x80" geared head.
Lathe, Lodge & Shipley, g. h., m. d., t. a., h. d.
Lathe, Davis 36"x18', t. a. complete.
Lathe, Niles axle, cone drive.
Pipe threader, Cox & Son 2" to 8" cap. arr. m. d. cutting-off attach.
Press, Southwark, forging, 300 ton with pump.
Press, Niles wheel 200 ton.
Shear, Carlins alligator 12" blades.

Davis Machinery Company

1-3-5 St. Clair St. Toledo, Ohio

Drill, 6 spindle Avey h. s. b. b.
Drill, No. 1 SS Garvin (Natco) duplex.
Gear cutter, 48"x12" Gould & Eberhardt, s.p.d.
Gear shaper, No. 6 Fellows, arr. for m.d.
Grinder, No. 6 Besly, dbl. spdl., disc.
Grinder, 10"x24" Landis, self-cont., m.d.
Grinder, 16"x36" Cincinnati uni., b.d.
Grinder, 16"x48" Sterling cylindrical, tree, c. s.
Grinders, No. 6 & 10A Bryant chucking, b.d.
Grinder, No. 23 Brown & Sharpe int. cyl.
Header, No. 1 Manville, sgl. stroke, solid die.
Keyseater, No. 2 Mitts & Merrill, b.d.
Lathe, 32"x264" Gleason, st. c. gear.
Press, No. 90-D Toledo, dbl. crank, m.d.
Punch, Long & Allstater multiple.
Screw machine, 1¼" model B Cleveland automatic.
Screw machine, 1¾" Cleveland model B automatic.
Screw machine, No. 3 Foster hand, b. d.
Screw machine, No. 515 Natl. Acme, 4 spdl. auto.
Screw machine, No. 52 Natl. Acme 4 spdl. auto.
Slotter, 10" vertical with 18" rotary table.

FOR SALE BY

Wm. C. Johnson & Sons Machinery Co.

1211 Hadley St., - - St. Louis, Mo.

Air compressors, 10" stock.
Bolt threaders, 1½, 1¾ and 2".
Drills, radial, master, new.
Drills, single spindle, m. d., (2).
Lathe, 28x14 American, q. c.
Lathe, 19"x8' LeBlond, q. c.
Lathe, 27"x20 New Haven, plain change.
Lathe, 38"x14' Putnam, q. c.
Pipe machines, 2, 4, 6, 8, 12, 16" & 18".
Planer, 60x60x10 Bement.
Shaper, 14" Smith & Mills.
Shaper, 21" Smith & Mills.

Joseph Hyman & Sons,

Tioga and Almond Sts., Philadelphia, Pa.

WORLD'S LARGEST STOCK
POWER PRESSES

No. 8C Bliss, double crank, 84", crank 8".
No. 4 United Eng. & Fdry., 4 crank, 156" between uprights, 6" dia crank 7½" stroke, weight 118000 lbs.
No. 6B Niagara, dbl. crank 36", crank 3½".
No. S 126 Ferracute, dbl. crank 124", crank 7½"—9".
No. 92½B, 92B, 91C & 90D Toledo, double crank.
No. SG 83 Ferracute, 46", 100 tons cap.
No. 57 Consolidated, grd. m. d.
No. 59½ Toledo, tie rod.
No. 74½ Bliss.
Nos. 73½ Bliss straight side.
No. 407-54 Bliss, toggle, double crank, t. r.
Nos. 1½, 3½A & 4A Bliss toggle presses.
Nos. 14 & 14½ Toledo horning presses.
No. 4 Williams & White bulldozer.
Nos. 2 & 13 Standard automatic drops.
No. 9C Badger State combination punch & shear.
No. 6 Hilles & Jones multiple punch, ram 100".
Presses, Waterbury-Farrel 6 plunger with cartridge clip dies, weight each approx 18,000 lbs., (2).
Punches & shears, single & double end.
Squaring shears, various sizes.
These and hundreds of others of popular makes and sizes, are in stock at our warehouse here.
Rebuilt and Guaranteed.

Noll Equipment Co., Inc.

2476 E. 13th St., Cleveland, Ohio

MACHINES FOR IMMEDIATE DELIVERY

Band saw, metal, Prentice 36".
Drill, multiple, Pratt & Whitney No. 12.
Gear finisher, 18" Gleason spiral bevel.
Gear generators, Gleason 8" straight tooth mfg. type, bevel, 5 h.p. motor, (4).
Gear lappers, Fellows, 6x16 helic. worm, mr in b., (2).
Gear roughers, 15" Gleason spiral bevel, (3).
Gear & pinion finishers, 15" Gleason spiral bevel, (5).
Lathe, Lodge & Shipley gd. hd. boring lathe, 30"x24', motorized.
Lathe, Lodge & Shipley gd. hd. boring lathe, 36"x24' motorized.
Milling machine, Becker No. 26BG, countershaft.
Pinion roughers, Gleason 15" spiral bevel, (2).
Pinion rougher, Gleason 15" spiral bevel, 5 h.p. mtr.
Pumps, centrifugal, 2" capacity.
Pumps, triplex, Gould, 2" capacity.
Radial drill, Mueller, 4', 11" round column, box table No. 5 Morse taper, Reeves drive & motor, rebuilt.
Saw, cold cut, Newton 8x8, motorized.
Saw, cold cut, Newton 12x12, motorized.
Screw machine, No. 2 Cleveland, single spindle.
Turret lathe, Gisholt, 13" swing, motorized.

FOR SALE BY

Wm. C. Johnson & Sons Machinery C

2111 Hadley St. St. Louis, M

Hammers, 3—100 lbs., Bradley.
Press, No. 5 Garrison double crank forging, 6" stroke 15" die space 49x16" bolster plate, 27,000 lbs.
Presses, 3—Frankfort double crank forging 4" stroke 10½" die space 34x9" bolster plate, 13,000 lbs. each
Presses, 2—No. 5 Garrison double crank forging, 6 str. 15" die space 52½x10" bolster plate 24,000 lbs. e
All of above equipped with hot shear blades.
William White No. 15 geared, 1½" stroke.

Standard Machinery Co.,

347 Indiana Ave. Grand Rapids, Mich

Drill, 40" New Haven No. 5, sliding head.
Drill, 2 spdl Leland Gifford, p. f., & t. a.
Grinder, cylinder, Heald No. 65.
Hammers, rivet, Grant No. 2 and No. 3.
Keyseater, No. 0 Mitts & Merrill.
Lag screw pointer, Pawtucket.
Lathes, mfg., 12"x6' Pratt & Whitney, (2).
Punch & Shear, No. 6 Lennox.
Roll former, Kane & Roach, 2 sets spindles.
Tapper, Anderson No. 40 Dial Feed Auto.
Welder, Expert Portable spot, 50 KVA.

The Nutmeg State Machinery Corp.

1041-1051 State St., New Haven, Conn

Chucking machine, Potter & Johnston No. 6A.
Drill press, H&W, 6 spdl., class B 12" overhang.
Drill press, Leland Giff., 4 spdl., b.b., p.f. to each spdl
Gear cutter, P & W 110".
Grinder, Diamond surface, 72" table feed.
Grinder, Landis No. 33 plain, with raising blocks, wil swing 27".
Grinder, P&W 12" vert. surface with mag. chuck.
Grinder, Walker No. 2 sgl. str., rot. sur. with 10" ch.
Grinders, Bryant No. 16, m.d. int. chuck. (like new)(2)
Miller, Brown & Sharpe No. 13B, production.
Miller, Kempsmith No. 32, Lincoln type.
Miller, Lees-Bradner No. 3B with 9 collets.
Profiler, Leland Gifford, grd , sgl. spindle.
Tappers, Anderson No. 40, m.d., dial feed.
Turret lathe, Warner & S. No. 3A univ., chuck only.
Turret lathe, Brown & S. No. 4, chuck p. f. to turre
Wire formers, Nilson No. 3 and No. 4, 4 slide.

Reliance Machinery Sales Company

1407 Brighton Place, N.S. Pittsburgh, Pa.

Air compressors, 348 and 450 cu. ft.
Bending roll, angle, Buffalo, cap. 4x4x½" angle.
Bolt cutter, 3" Acme, belt drive.
Brake, press, 6'x16 ga. Robinson, toggle.
Bulldozer, No. 4 Williams-White.
Grinder, No. 14 Besley double disc, 28" discs.
Grinder, knife & edge, 13' Bridgeport, m.d.
Hammers, riveting, 3/16", 1/4" and 3/8".
Press, No. 82-C Toledo dbl. crank, 44" wide, 5" shaft 2" stroke, m. d.
Pump, Goulds centrifugal, 3 stage, 250 g.p.m. against 47' head, m. d., 3-60-220 v.
Pump, hydraulic, 15 G.P.M., 1500 lb.. m.d.
Punch, L&A horiz., 1" thru 1".
Punch, 48" tht., single end, 1" thru. 1", arch. jaw.
Punch, 48" tht., single end. 1½" thru 1", arch. jaw.
Shear, rotary bevel, ½", m.d.

What do you need? What have you for sale?

USED AND REBUILT MACHINERY
FOR SALE BY

ang Machinery Company — 28th St. & A. V. R. R. — Pittsburgh, Pa.

Air compressor, 10"x10" Ing. Rand, 245 c. f. m., m. d.
Air compressor, N-503 Chicago, 493 d.f., oil dr.
Angle planer, No. 3 Thomas, m. d.
Blower, 6 B Wilbraham-Green, 11,250 c. f. m., m. d.
Bolt cutter, staybolt 1¼" Acme, leadscrew, m.d.
Bolt cutters, Acme sgl. & dbl. head, 1¼"—2½".
Brake, press, 10' Ohl, 10 gauge.
Broach, No. 2 La Pointe, stroke 44", m. d.
Bulldozers, No. 2 & No. 4 Wms. & White, m.d.
Centering machine, P&W, 4" 2 spdl., b.d.
Crane, 5 ton OET, 43'6" span, m.d.
Column facer, 60" dia. Espen Lucas, b.d.
Die filer, Rearwin, tbl. 18"x17", str. 8".
Drill, mult. 3-spindle Rockford, s. p. d.
Drill, mult. 10 spindle D-12 Fox, b. d.
Drill, radial, 2½' Bickford, No. 4 m. t., m. d.
Drills, upright, 11" to 34", b. d. & m. d.
Duplicator, No. 8 Thomas, 42" throat, m. d.
Gear cutter, spur, 30"x16", B. & E., m. d,
Gear cutter, spur 36"x9" G. & E., m. d.
Gear cutter, spur 40"x12" G. & E., s. p. d.
Gear miller, No. 1 Bilton, cap. 4", b. d.
Gear planer, 26" Gleason, bevel, m.d.
Gear planer, 54" Gleason, bevel, m. d.
Generator, 100 KW Westinghouse d. c., 125 v. b. d.
Generator, 150 KW Jeffrey, d. c. 250 v. b. d.
Grinder, cyl. Wells 6"x14", m. d.
Grinder, dbl. end, Standard Elec. 7½ H. P. 220 v. d. c.
Grinder, d. e. 12" Marschke, m. d.
Grinder, cyl. 15"x30"x96" Norton, m. d.
Grinder, univ., No. 5 B. & S., 20"x72", b. d.
Grinder, worm-hob, Pfauter "FS", b.d.
Hammer, 50 lb. Little Giant, s. p. d.
Hammer, steam drop 1000 lb. Chambersburg.
Hammer, steam drop 1800 lb. Massillon.
Hammer, steam forging 900 lb. Bement-Miles.
Hammer, steam forging, 1100 lbs. Pittsburgh.
Hammer, steam forging 2000 lb. Niles-Bement-Pond.
Heater, Rivet, No. 3 Berwick, m. d.
Keyseater, No. 2 Baker, b.d.
Keyseater, No. 3½ Baker, 3½", m. d.
Lathe, 84"x41" Young, m.d.
Lathe, 10"x45" Seneca Falls, m. d.
Lathe, 16"x6' Porter, p. c. g., b. d.
Lathe, 18"x8' Mueller, c. c. g., b. d.
Lathe, 18"x8' Prentice turning, d. b. g., p. c. g., b. d.
Lathe, 24"x12' Reed, s. b. g., p. c. g., b. d.
Lathe, driving wheel 78" Bement-Miles, dbl. end, m.d.
Lathe, gun boring, 2 bar, cap. hole 12"x40', m. d.
Lathe, pit 120"x17' Beckett & McDaniel.
Miller, plain, No. 2 Pratt & Whitney m. d.
Paper cutter, 23" Chandler & Price, blade 27".
Paper cutter, 44" Brown & Carver semi-auto., m. d.
Pickling machine, Mesta, 8-12' arms.
Pipe machine, 10" Landis, m. d.
Pipe machines, 2"—4"—12" & 18" Weiland, b. d.
Pipe machine, No. 88 Jarecki, 2½"-8", m.d.
Planer, 30"x36"x10' Powell, 1 head, b. d.
Press, double acting, No. 1 Bliss, roller feed,
Press, end wheel Stiles-Parker, stroke 1½".
Press, end wheel No. 3 Bliss, roll feed, m d.
Press, foot, No. 2 Swaine, bed opening 6"x7½",
Press, forging, 1500 ton Farrell-Birmingham, m.d.
Press, hydr. 200 ton Watson-Stillman upr., stroke 26"
Press, hydraulic 250 ton Baldwin-Southwark, 4-post.
Press, hydr. Woods 1000 ton, platen 42"x9'.
Press, horning No. 21 Michigan, stroke 18".
Press, o. b. i. No. 68-C Bliss, stroke 5".
Press, o.b.i. No. 3 Toledo, stroke 14".
Press, o.b.i. No. 2 Bliss, stroke 2".
Press, perforating, No. 51 V&O, str. ½", dbl. crk.
Press, straight side No. 59 Bliss, stroke 5".
Press, straight side No. 59 Toledo, stroke 6".
Press, straightening, 20 ton Manley, lever action.
Press, hydraulic shell bending, No. 4, 12-cyl.
Pump, centrifugal Worth. CL-C, 6" suction, 5" dis.
Pump, Worthington 9"x2"x12", 22 gpm. 3000 lb. steam.
Pump, centrifugal Gould 2 H. P., m. d.
Punch & shear, dbl. end Ryerson, ½" thrt. 54".
Punch & shear, dbl. end No. 1½ L & A, 1¼"—1", m. d.
Punch, horizontal No. 2 H & J, 1"—1", throat 14½".
Punch, multiple W & W cap. 175 ton, m. d.
Punch, mult. 10' L & A, cap. 340 tons pressure.
Punch, lever, No. 58 Niagara, ¾"—1", throat 36".
Punch & shear, No. 3 L & A, rap. act. ¾"-4".
Punch & shear, "C" Cleveland, ½"—4", throat 24".
Punch & shear, No. 3 H & J, 1¼"—1", throat 48".
Punch & shear, No. 14 W & W, 1¼"—1", throat 16".
Punch & shear, "EF" Cleveland, 1"—1", throat 15".
Punch & shear, "EF" Cleveland, 1¼"—1", throat 60".
Punch & shear, Cleveland "G", 2" thru 1", m. d.
Punch & Shear, Garrison, 2½"—1½", throat 16".
Punch & shear, W. & W., 2½"—1½", throat, 15".
Punch, 3-A Royersford, 10" throat, 1"-4", m.d.
Punch, No. 6 L&A, 1¼" thrt. ¾"-4".
Riveter, 70 ton Hanna, 24" reach.
Riveter, Hanna Pinch Bug, 10" reach.
Saw, band, Laidlaw, wheels 30" dia. m. d.
Saw, cold, No. 14 Higley, cap. 7" round.
Saw, cold & rot. planer, No. 216 New., 20" saw, m.d.
Saw, cold 60" Newton, m. d.
Saw, cold, Espen Lucas, blade 22", cap. 6" rd.
Saw, No. 1 Hunter high speed, m. d.
Shaper, 14" Gould & Eberhardt, m. d.
Shaper, 32" Smith & Mills, b. d.
Shaper, draw-cut 48" Morton, m.d.
Shear, allig. Pittsburgh, cap. 2"-2½", m. d.
Shear, allig. No. 7 United, 6" square, m. d.
Shear, alligator No. 4 D&K all steel, cap. 5", b.d.
Shear, alligator, cap. 1¼", blade 16".
Shear, Bevel, No. 2 Ryerson, m. d.
Shear, rotary Newbold, cap. ½", throat. 50", m. d.
Shear, slab, Garrison vertical, cap. 24"x18", m. d.
Shear, slitting Columbus 10"x3/16".
Shear, sq., 36"x¼" United, b.d
Shear, 40"x¼" American, throat 6", m. d.
Shear, 48"x¼" American, throat 6", m. d.
Shears, squaring, 54"x3/16" United, throat 5", m. d.
Shear, squaring, 10'x14 ga. Ohl, b. d.
Slotter, portable 60" Morton, m. d.
Slotter, 15" Dill, m.d.
Upsetter, 4" Ajax, steel bed, m.d.
Upsetter, 6" Ajax, steel bed, m.d.
Vertical attachments, Nos. 1, 3, 4 and 5 millers.
Welder, 150 amps. Lincoln portable.
Welder, 200 amp. Lincoln, 4-cyl. gas engine.
Wire straightener, ½" Schuster, 4' cut-off, b. d.

W. L. Steege Mchry, Co.,
100 S. Jefferson St., - Chicago, Ill.

Gear cutter, No. 326 Brown & Sharpe.
Grinder, 16x32 Landis, crankshaft.
Hammers, 50 lb. and 60 lb. Bradley.
Lathe, pulley, 32" Cincinnati.
Lathe, pulley, 60" Niles.
Milling machine, No. 1 Pratt & Whitney.
Baton maker, Cone auto.
Welder, spot, Toledo 25 KW.

C. R. Daniels
1514 W. Capitol Drive, Milwaukee, Wis.

Arbor press, No. 5 Greenerd, 12 ton cap., rebuilt.
Automatic, ½" Cleveland, single sp., Model B.
Cut-off, No. 1801-C Delta abrasive, with motor.
Drill press, No. 2 Baush 22 spindle. 16"x30" head.
Gear hobber, No. 1 Adams, complete, b d.
Keyseater, No. 2 Mitts & Merrill, complete, b.d.
Milling machine, No 0 Burke, bench, hand feed.
Spot welder, 10 kva., Taylor Winfield 6" horns.

S. M. Regar Machinery and Mill Supplies
Tampa, - - - - Florida

Air compressors, portable and stationary.
Bolt and pipe threading machines 4—12" cap.
Broaching machine 3-B LaPointe.
Cutting-off machines and cold saws.
Planer, Putnam, 24"x24"x8'.
Planer, Sellers, 36"x36"x10'.
Radial drills, Baush 7', Harrington 4', American 3'.
Slotter, 15" Bement Miles, 36" pow. cir. table.
Shaper, 36" Putnam friction feed.
Lathes, Morton keyseater, 18" boring machine, horiz. for 155 shells.

North Machine Tool Corporation
179 Lafayette St., New York, N. Y.
WOrth 4-5690

Automatics, Clev. model B, 7/8" single spindle, (3).
Automatics, Clev. model A, 2", single spindle, (3).
Automatic, No. 55 Acme 1½", 4 spindles.
Automatic die cutting mach., Keller w. 2 motors.
Gear cutter, 36" Brown & Sharpe.
Gear cutter, 15" Gleason, straight bevel generator.
Grinder No. 1 Cincinnati univ. tool.
Grinder, tool, Gisholt univ.
Grinder, 12" Pratt & Whitney, vert. surf. w. motor.
Lathe, 14"x8' Monarch, q.c.g.
Lathe, 20"x12' Monarch, q.c.g.
Lathe, 20"x40" Rahn Larmon, ext. bed gap, g. h., m.d.
Millers, Hendey Lincoln type. (2)
Miller, No. 2 Wabeek swivel hd., univ., (new).
Shaper, 15" American.
Shaper, 30" Ohio.
Turret lathe, 24"x24" Jones & Lamson, grd. head.
Turret lathe, 24" Gisholt, 2½" hole through spindle.
Turret lathe, 24" Gisholt, 5 5/16" hole through spindle.

Alex Zeeve & Company
2269 Woolworth Bldg., New York, N. Y.

Boring bars, portable, — 8"x18', 8"x12' and 2½"x7½" Underwood.
Bolt threaders, 2" Acme "Class A", 1½" National.
Drill, radial, 3' Mueller, gear box, s.p.d., box table.
Gear cutter, spur, No. 2A Newark, s.p.d., cap. 24"x8"
Grinder, cyl., 12"x96" Landis plain.
Hammers, forg., No. 4-B & No. 1B Nazel, pneumatic.
Hammers, pr., 500 (2) & 400 lb. Beaudry "Champion".
Ironworker, comb.—Size 91—16 Smith armor-plate, with notcher, a. c. — m. d.
Keyseaters, No. 3 Mitts-Merrill, No. 2, & 1, Baker.
Lathes, engine—39"x20' Rahn-Mayer-Carpenter semi-q.c.; 28"x16' Walcott, q.c.g., taper,; 24"x16' Whitcomb-Blaisdell, q.c.g., taper.
Planer, crank, 28"x24"x24" stroke Cincinnati, 1 rail head, belt drive.
Punch & shears, dbl. end, style "W" Cleveland, cap. 2½" thru 16", with self-cont. jib crane.
No. 3A Rogersford, cap. 1" thru ⅞", shears 8" x ½" flats or 1¼" rounds, a.c., m.d.
Punch presses, o. b i. No. 4 Rockford geared, 2½" stroke (45 tons)., No. C-4 Ferracute plain, 1½" stroke (35 tons.); No. 29 Swaine plain, 1½" stroke (10 tons.)
Roll, plate bending—9'x5/8" Wicks drop end hsg., bal. bar, power elev., geared a.c.—m.d.
Saw, metal cut. band, Avey "Milband", cap. 6½"x6½", a.c., m.d.
Shears, throatless, ½" & 10 ga. Marshallt., a.c.. m. d.
Shears, misc., 8'x¼" Lennox rotary splitting, a.c., m.d. 60° Yoder rotary, 14 gauge capacity.
Tapper, No. 8 Gaterman pneu. oscillating, ¾"x4" cap.

ALSO MANY OTHER TOOLS.

Sheet Metal Engineering Co.
919 W. 49th Place, Chicago, Ill

Band saw, metal cutting, Kalamazoo, with 220 volts, 6 cycle, 3 phase motor and switch, $250.
Shear, Libert, high speed, 10 ga. cap., 60" throat, han control, complete with 220 volt, 60 cycle, 3 phase mt and switch, $875.
Each unit in excellent shape, can be seen in operatio in our shop. Prices are FOB our shop.

Machine Tools Sales Company
513 N. 17th Street, - Philadelphia, Pa

Bolt cutter, 3" Landis, geared motor drive.
Crank slotter, 16" Sellers, 48" dia. table.
Crank slotter, 12" Bement.
Crank slotter, 12" Sellers.
Drill, 3 way Garvin, No. 4 taper, pwr. fd. index tabl
Drill, Avey sensitive, 7" overhang, No. 2 taper.
Form cutter grinder, Fisher.
Gear bobber, 12" Rhienna.
Gear tooth rounder, 12" Rochester.
Grinder, No. 2—12x32 Landis universal.
Hole grinder, No. 2 Garvin.
Lathes, boring, 3 shell 34" swing x 12', collet chuc 17½" deep, 6¾" bore.
Lathe, American Fox.
Lathe, 14" Bardons & Oliver facing.
Planer, 72"x72"x12' Sellers, spiral gear drive; brace hous., hyy. dty., dp. boxed rail; wt. app. 60,000 lb
Planer, 26"x26"x8' Cincinnati.
Punch, R.L.U.m.S No. 24 Pels "Johns". 24" throat.
Saw, cold 26" Newton, No. 200.
Strip mill, cold Bliss duplex, 16"x24", 2 hl. Bliss.
Strip mill, reversing cold, 16"x24", 2 hl.
Testing machine, 100 000 lbs. Tinius Olsen univ.
Threading lathe, 12"x8' Auto. Machine Co.'s, s. p.
Threading lathe, 13"x5' Auto. Machine Co.'s, s. p.
Turret lathe, No. 2 Warner & Swasey.
Turret lathe, 28", 43" Gisholt, gap type, 35" chuck.
Turning lathe, 26"x14' Bridgeford plain, m. d.
Thread miller, No. 23, 6" Smalley Gen., 6" spindle.
Tier lift truck, 6,000 lbs. Lakewood.
No. 6 West hyd. tire setter, 18 cyl. 30"x63", Trip pump.

Jones Machine Tool Company
Front & Pike Sts., Cincinnati, Ohi

LATHES

18"x8', Nat., q.c., gd hd.
14"x6' LeBlond q.c. 3step
18x10 Monarch 3S q. c.
18x8 Lodge & S. Pat. Hd.
24"x10 Niles, l.c.
24"x16' Bradford, l. c.
28x10 New Haven c. d.
30"x10' Niles, l.c.
24x48x14' S & B-dbl. sp
30"x15' Amer. q. chang
24"x22' L. & S.Quick C
30x18' L. & S. Quick C

PRESSES

10'—10 ga. Ohl press brk.
No. 5 Bliss (stiles type).
26" throat Wickes punch.
No. 15 Tol. deep throat
No. 92D Tol. dbl. crank.
No. 96 B. & B. 48" D. C.
No. 96§ Bliss 48" dbl.
No. 160 Cons. dbl. cran
No. 44 Niagara dp. thr
Robinson s. s. press, 1
No. 20 Excelsior m. d.
69 N double action.

MISCELLANEOUS

42" Bullard ver. bor. mill.
4' Hammond radial.
48" B. & S. gear cutters.
2—Trundle thrd. millers.
8—Porter Cable lathes
Ingersoll (tub) grinder.
24" Streit pulley lathe.
No. 2 Savage nibbler 36" throat, ¾" cap.
40 k. w. spot weld. 36"
150 t. vertical hyd. pr.
2" Reliance bolt cutter.
¼" Schuster wire strai
250 ton hyd. wheel pre
24"x24"x7' Powel plane
32"x14' Niles planer 1 h
24" Cinc. b.g.d. shaper
6x20" Fitchburg cyl. gr.

USED AND REBUILT MACHINERY

FOR SALE BY

Siegman Machinery Co.
561 W. Washington Blvd., Chicago, Ill.

Broach, vertical, Michigan, 2 ton.
Drill, camel back, 2 spindles, large base.
Drill, horizontal, 2 way, 16" travel.
Drill, horizontal, Garvin S1 duplex.
Grinder, Bryant No. 10A.
Grinder, Heald, 65, internal with motor.
Grinder, surface, Pratt & Whitney, m. d., 14" wheel, working surface 12½x41, equipped with 3 phase 60 c. 220 v. motor, 10"x31" mag. chuck equip. with convert.
Grinder, No. 2 Brown & Sharpe, universal.
Grinder, worm gear, Pratt & Whitney, m. d.
Hobbers, Barber C. sgl. overarm No. 12 m. d. (2).
Lathe, crank, LeBlond, geared head.
Lathe, Lo Swing 8x32, grd. hd, dbl. carriage.

Please send us your inquiries.

B. W. Matson Machinery Sales
310 W. Michigan St., Milwaukee, Wis.

Broach, oil gear, XA3 m. d.
Centering machines, belt drive, 8".
Dynamometer, Sprague, 50 h.p., 1500-3500 rpm.
Gear hobber, 12" Adams-Farwell.
Grinder, No. 6 Bryant, hole, m.d.
Grinder, Norton 14"x36", crankshaft.
Grinder, P & W, worm thread.
Lathe, Fifield, 38"x18', 5 step cone drive.
Hammers, Bradley helve, 50-75-100 lb.
Slotter, Putnam, 15" stroke, 34" rotary table.

FOR SALE BY

Failor-Strafer Machinery Co.
880 Bergen Ave., Jersey City, New Jersey

Blue print drying machine, 42" Paragon.
Drills, 3' American sensitive radial.
Drill, No. 4 Baush, adj. mult. spindle, 22" rd. hd.
Drill, 6' Niles-Bement-Pond radial.
Keyseater, No. 3 Mitts & Merrill, b.d.
Pipe threading machines, (Saunders & Cox) with die heads and dies 6" to 12" incl.
Press, No. 1 Bliss toggle.

Russell Machine Co.
438 Oliver Bldg. Pittsburgh, Pa.

Broach, No. 3 LaPointe, m. d.
No. 24 Foote-Burt 24" heavy duty, s. p. d.
Gear planer, 36" Gleason, b.d.
Gear planer, 84" Gleason, m.d.
Grinder, univ. No. 5 B&S, 20x72", b.d.
Grinder, Yankee drill, cap. up to 2½".
Lathe, 84"x41" Young, m. d.
Press, hyd. 1000 ton wood platen, 42"x9'.
Press, No. 3 Bliss, end wheel, roll feed.
Presses, o. b. i. No. 3 Toledo and No. 18 Bliss.
Punch, E F Cleveland, 60" th. 1¾"—1" arch jaw.
Punch, multiple, style "E" L&A 15½" th. cap. 340 tons.
Punch, No. 2 Hilles & Jones, horiz., b.d.
Saw, Laidlaw metal cutting band saw, m. d.
Shaper, draw cut, 48" Morton, m d.
Shaper, 32" Smith & Mills, m. d.
Slotter 15" Dill, table 34" diam., m.d.
Upsetting machines, 2½, 3½, 4 and 5" Ajax iron bed.

West Penn Machinery Company
1210 House Building, Pittsburgh, Pa.

Air compressors, 30 to 2500 cubic feet.
Baling press, paper, Logemann, b.d.
Bending rolls, 10'x¼", m. d.
Blower, No. 4 Roots, capacity 2110 c. f. m.
Bolt cutters, ¼"-2"-3"-4" Acme, b.d.
Blue print machine, 60" a. c., 110 volt.
Bulldozers, Nos. 2, 4, 6, 9, 28, & 30.
Crusher, jaw, No. 4 Champion, b. d.
Die filer, No. 3 Thiel, m. d.
Drill sharpener, Ing.-Rand "Leyner", 1¼".
Drill, radial, 4' Bickford.
Drills, upright 16" to 36".
Drill, No. 24 Foote-Burt, 3", b. d.
Engine, gas, 20 horse power Bessemer.
Gear tester, bevel 18" Gleason.
Generator, plating 6-v. 3500 amps.
Grinder, surface diamond 20"x15".
Grinder, knife 10" Bridgeport, m.d.
Grinder, roll, Farrel 30"x76".
Grinder, surface vertical, 30" table, 16" wheel, m.d.
Grinder, tool & cutter, No. 2 full automatic, m. d.
Grinder, plain 12x96 Landis.
Hammer, drop board, 500 lb. B. & S.
Hammer, drop board 800 lb. B&S.
Hammers, 50 lb., 75 lb., 100 lb., 200 lb. Upright.
Hammer, 100 lb. Bradley cushioned helve.
Hammers, steam, forging & drop.
Keyseater, No. 2 Mitts & Merrill, 1½x12".
Keyseater, No. 2 Baker, 2"x20", b.d.
Lathes, speed, 11" and 13" Blount, m. d.
Lathe, brass 18x6", friction head, power feed, b. d.
Lathe, 7"x32" P&W, precision, m.d.
Lathe, 7"x30" Dalton, t.a.
Lathe, 16"x6' Blaisdell, b. d.
Lathe, 42"x20' New Haven, geared head, m. d.
Lathe, roll, 54"x20' std., m. d.
Lathes, turret, Nos. 1, 2 and 3 W. & S., b. d.
Locomotive, gas, 6 ton Milwaukee, 36".
Miller, hand, No. 6 Whitney, m.d.
Miller, shaper, duplex, No. 14 Cochrane-Bly, m.d.
Miller, vertical, Burke, table, 16x6, b.d.
Miller, spline, P&W, double, 2".
Nibbler, No. 1 Campbell 3/16", 6" gap, m. d.
Nibbler, L.&A., ⅜"-.36" throat, m.d.
Pipe mchs., 2", 4", 6", 8" 12" & 16" Landis-Oster-Williams.
Presses, horning, Nos. 38 & 39½ Bliss, b. d.
Press, arch, No. 30 Bliss, b.d.
Press, No. 19 Bliss o.b.i., b.d.
Press, o.b.i., 50 ton Garrison, geared.
Presses, Stiles, type, 1¼ and 2½" m. d.
Press, knuckle joint, 75 ton Howard.
Punch, "EF" Clev. D. E. 36" gap 1¼"-1".
Punch, No. 6 L&A, ¾"-⅝", b.d.
Punch & shear, 1"—1", 32" gap.
Punch, horiz., 1"-1" Cleveland, m.d.
Pump, 1500 lb. Triplex vert., 13 gal., m. c.
Riveters, air, hammer, spinning.
Saw, cold 60" Newton, m. d.
Saw, metal band, 16"x10" Napier.
Saw, hack 12x12 Racine, b. d.
Saw, friction No. 1 Ryerson 220/3/60.
Shapers, 16", 20", 24" & 36" Gould & Eberhardt.
Shear, bevel 4" Lennox m. d.
Shears, alligator, 10", 2", 3", 4" & 6".
Shear, up-cut, 22" Aetna, m. d.
Shear, 10'x14 ga. Niagara, m.d.
Shear, Rotary ¾" Newbold, 50" gap.
Slotter, 12" Putnam, b.d.
Straightener, McKay 17 roll, 4" dia., m. d. 48".
Straighter, McKay 17 roll 4¼". — 54".
Straighteners, 1½" & 3" Sutton, m.d.
Straightener, 60", 11 roll, 3¾" dia.
Straightener, 75 ton hyd., 10' bed.
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20 h.p. motor, a.c., with magnetic chuck & generat.
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Automatic, ⅝" Cleveland.
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Grinder, disc, 18" Besley, plain.
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Miller, No. 1V Brown & Sharpe, plain.
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Radial, 24" Carleton sensitive, belt, high speed.
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Boring mill, Bickford, 4" bar capacity, horizontal.
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Sheet metal working machinery, hand and power.
All types of new and reconditioned equipment.
Apron brakes, press brakes, shears, folders.
Bending rolls, corrugating rolls, forming rolls.
Punches, beaders, rotary machines, stakes, etc.

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Elyria - - - - - Ohio

Drills, Bausch multiple spindle.
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600 - 750 - 800 - 1100 - 1500 - 2000 pound single frame in good order.

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No. 5A Potter & Johnson semi-automatic rebuilt by us and in excellent condition. Can ship at once. A real opportunity to someone.

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Buffers, 3 hp., d.c.
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Shaving machine, Pratt & Whitney.

The Reeve-Fritts Company
28 N. Clinton St., Chicago

Boring mill, Newark horizontal, 2½" bar.
Grinder, Lumsden face, 12" cup.
Grinder, tool, Gisholt lathe & planer.
Pipe mach., 2 spdl. Murchey, 2" cap.
Punch & shear, No. 7 L&A, sgl. end, m.d.

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Write Box 441, Owatonna, Minnesota

Power press brake, D. & K. or Version, from 3 to 6', for light work 18 gauge.
Spot welder, motor driven, about 15 KVA.

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New Products for Present or Future Development.

Our client, a large reputable, nationally known manufacturer is seeking new products or design improvements in the field of industrial equipment and consumer's durable goods. Also interested in new manufacturing processes which can be applied to heavy machinery. All propositions submitted in confidence. State only general field of application in first letter. Address—Bosley Associates, Room 1853, Daily News Building, Chicago, Illinois.

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HIGH SPEED CUTTING TOOLS
BOUGHT AND SOLD
MILLING CUTTERS, TWIST DRILLS, ENDMILLS, REAMERS, SLITTING SAWS.

AMERICAN TOOL SALVAGE CORPORATION
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FOR SALE—One P. & H. Type "AO" two-ton cap. Three motor cab crane 37' 3" span, used very little.

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48" Bement-Miles vert. Boring Mill.
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60"x42"x15' Patch 4 head planer.
42"x42"x15' Bedford 2 head open-side planer.

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42" Power Shear, ¼" cap.
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26"x16' Niles Lathe.
Shapers, 7", 12", 16", 20" and 24".

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		NET PRICE
3/8"—4 Jaw	Independent Chucks	$ 98.00
20"—4 Jaw	Independent Chucks	112.00
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FOR SALE — GOOD TOOLS

Auto., Cleveland, ⅜", 4 Hole turret, No. 33866 ..... $2650.
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Gear Hobber, No. 3 Barber Coleman, Motor driven ..... $2000.
Gear Cutter, No. 6 B. & S., Cap. 60"x11" ..... $3000.
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Lathe, 14"x6' LeBlond, Q.C., B.D.... $1250.
Lathe, 20x8 Hamilton, Hvy. Pattern, Q.C., Taper, Draw in Collets, Chuck & Countershaft ..... $2700.
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Press, No. 126 Max Ams O.B.I. 1" str. $325.
Shaper, 14" Steptoe, SG., Vise & Motor ..... $1000.
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Shaper, 16" Steptoe, B.G., Vise & C. S. ..... $1050.

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Foster Machinery Co.

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Forging roll, No. O.C. Ajax.
Punch, EF Cleveland, 24" throat, 1¼" cap.
Saw, 6" Newton, cold.

SELLING FOR CUSTOMER

Brake, 10' Whitney-Jensen, No. 14 Ga., with 24" of fingers ..... **$610.**
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Press, Hydraulic, Hannifin, 20 ton arbor, C frame, motor drive complete.... **$450.**
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2—4" Four Spindle Automatic Screw Machines. With threading attachments
2—2¼" and possible up to 2⅝" capacity four or six spindle machines. Must have threading attachments
2—1½"—1¾" capacity machines—Four or Six Spindle. On this job it is much preferred to use a Six Spindle Machine. Require threading attachments
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1—3 bushel capacity Oil Separator with Crane

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IMMEDIATE DELIVERY

Satisfaction Guaranteed

14"x9"x12" BURY AIR COMPRESSOR
2-stage horiz., water cooled with inter-cooler, flat belt, idler and parts; 100 h.p., 3 ph., 60 cy., 220 volt motor with resistance grids, controller and base, 48"x6' ASME receiver with pressure gauge, safety & drain valves

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1¼" Cinc. Bick. Box
Col. Prod., m.d. & m., p.t. to spdl., 2 Buhr adj. hds.
Fox Mult. Spdl. with tap. att. (6)
Kingsbury 4 spdle., auto. index device
21" Rockf. Drills (2)
21" Minster Drill
Natco Rot. 6-spdle.
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Western Radial Drill, heavy duty

GEAR EQUIP.
No. 36ST Gould & Eberh. Gr. Gash.
No. 5A Lees Bradner Hobbers (3)
W. & W. Gr. Cutter, 96" dia. x 52" fa.

GRINDERS
No. 1 Osterholm fa.
No. 126 Gardner
dbl. spdl. hyd. fd.
No. 20 Bryant Int.

LATHES
14"x11' Wickes Crankshaft, (2)
13x5' Pratt & Whitney, motor drive
14¼x24 Jones & L. Flat Turret
x36" Jones & Lamson m.d. & m.

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No. 3 Craftsm. Rot. Production
4" Ingers. Rotary, 3 hd., m.d.
6" Newt. Rot., md.
Trundle Thrd. (3)
Ingersoll Mill

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150 KW Fed., m.d.
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150 KVA Fed. Seam

MISCELLANEOUS
Balancer, 18" Gisholt Static (2)
Boltcutter, Nat'l. 2-spdle., 1½" cap.
Broach, 6-ton Amer. Vert. Hyd. m.d.
Bulldozer, No. 5 Williams & White
Core Blowers, No. 6 Demmler, (3)
Hammer, Bradley 15 lb.
Rivet Heaters, Berwick (4)
Riveting Hammer, No. 5A High Sp.
Slitter, 42" Yoder
Trucks, Elwell Parker Elec. Mule
3 ton Auto. Hi-Lift
Upsetter, 1½" Acme Steel Bed
Upsetter, 1½" Ajax
Wire Strnrs., 3/16" Shuster to 20' (6)
X-Ray Mach., Gen. Elec. 250,000 V. 2⅝" solid steel
5A High Speed Riveting Hammer
6C Rockford D.C. S. S., 4½" cr.
No. 62 Bliss Open Bk., long str. (2)
No. 4 Adri. O.B.I.
No. 4 Toledo O.B.I., m.d.
Nos. P-2 & P-3 Ferracute, g.m.d.

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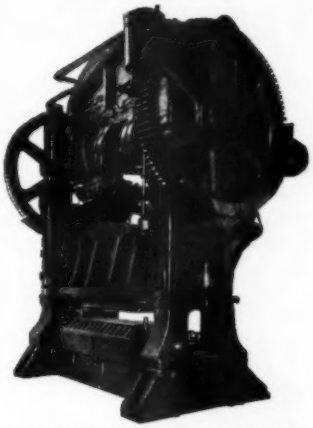

NO. 12412½ HAMILTON STRAIGHT SIDE DOUBLE CRANK PRESS
Tie rod frame, single action, double geared
Dia. crankshaft at brgs. & crank 12"—16½", Stroke 10"
Adjustment of slide 8"
Die space, stroke down adj. up top bed 28"
Thickness of bolster 10"
Distance bed to gibs 29"
Distance from floor to top of bed 26"
Height from floor to center of cksh. 13'1½"
Extreme height that must be cleared 20'
Speed of crankshaft 12 r.p.m.
Ratio of gearing 35.3:1
Width between uprights 126"
Distance between gibs 120"
Area of slide face F to BxR to L 45"x120"
Area of bed to F to B x R to L 45"x124"
Opening in bed F to B x R to L 25"x36"
Floor space over all F to B x R to L 140"x192"
Weight 250,000 lbs., approx.
Pneumatically actuated mult. disc friction clutch and disc type brake with push button control, "1-shot" lubr. system
Motor for main drive 50 h.p., 1200 r.p.m.
Motor for slide adj. 10 h.p., 1800 r.p.m.

SLEEPER & HARTLEY SPRING COILERS
No. 2½ Ser. 332 Univ. Clutch, m.d. (2)
No. 1½ Ser. 346 Univ. Clutch, m.d. & m.
No. 1 Series 288 Universal Segment Type
No. 3 Series 261 Univ. Segment Type, md.
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Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½

Below—300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½

Right—200 Series

Tool No.	Shank Size
200	¼x¼x2
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

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JOBBERS OR SHORT LENGTH

Size Inches	Our Price Per Dozen Carbon	Our Price Per Dozen High Speed	Length Overall Inches
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5/64	.91	1.86	2⅝
3/32	.94	1.92	2¾
7/64	.96	2.04	2⅞
⅛	.99	2.16	3
9/64	1.02	2.34	3⅛
5/32	1.05	2.52	3¼
11/64	1.10	2.70	3⅜
3/16	1.24	2.91	3½
13/64	1.38	3.15	3⅝
7/32	1.51	3.45	3¾
15/64	1.65	3.75	3⅞
¼	1.79	4.05	4
17/64	1.93	4.50	4⅛
9/32	2.09	4.95	4¼
19/64	2.20	5.40	4⅜
5/16	2.39	5.85	4½
21/64	2.59	6.45	4⅝
11/32	2.78	7.05	4¾
23/64	3.03	7.65	4⅞
⅜	3.30	8.25	5
25/64	3.58	9.00	5⅛
13/32	3.85	9.75	5¼
27/64	4.26	10.50	5⅜
7/16	4.68	11.25	5½
29/64	5.09	12.00	5⅝
15/32	5.50	12.75	5¾
31/64	6.05	13.65	5⅞
½	6.60	14.55	6

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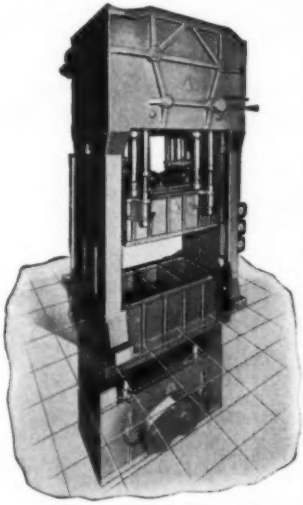
CLEARING CRANKLESS TRIPLE ACTION PRESS

4 Point Suspension Type
Combined capacity blankholder and plunger slide 1350 tons
Bed 84"x133"



PRESSES—STRAIGHT SIDE

No. 58 TOLEDO, 3½ str.; Bed 21"x22"
No. 55 TOLEDO; 1½" str.; G.M.D.
No. 73½ BLISS; 2" stroke

PRESSES—DOUBLE CRANK

NO. 97-H TOLEDO DOUBLE CRANK — Distance Between Housings 173"; Bed area 60"x173"; 10" stroke; approx. 650 tons; Weight 245,000 lbs.

No. 9610¼ HAMILTON, 10" Shaft, 10" Str., 97" between housings, M.D.
No. 7-C BLISS, 66" Bet., M.D.; 7¾" Stroke
No. 95-D TOLEDO, 10" Str., M.D.
No. 884 CHICAGO STEEL, 12" Stroke, 86" Between Housings, 8" Shaft

ALL MOTOR DRIVEN—TIE ROD

No. 60-D-84 CLEVELAND, 16" str.; 6" shaft; Bed 48x85"; D. B. G.; 16" Die space
No. 8-E BLISS, 8" Str. & Shaft; 108" Bet., Air Cushions
No. 154G CLEVELAND, 84" between housings
No. 94-G TOLEDO, 14" Str. 85" bet.
No. 93-E TOLEDO, 12" str.; Bed area 36x60"
No. 93-H TOLEDO, 12" str.; Bed area 42"x84"
No. 93½-F TOLEDO, 6" str.; Bed area 36"x66"
No. 605½ HAMILTON, 8" str.; 61" bet., Bed 33x80"

PRESSES—DOUBLE CRANK—GAP FRAME

No. 205-E TOLEDO, B.G. 4" Str., Bed 72"x28"
Nos. 202-D & 202-E TOLEDO, 5" strokes
Nos. 206-F TOLEDO, 87" between housings
Nos. 173-B & 174-B BLISS CONSOLIDATEDS
No. 76B½ NIAGARA, 5" str.; 43" opening; Bed 18x51"

PRESSES—TOGGLE

No. 178 TOLEDO Single Crank, 50" bet. housings, 10" Shaft; Stroke of Plunger 26"; Stroke of Blankholder 18"
No. 408B BLISS DOUBLE CRANK TOGGLE DRAWING—84" bet. housings; Twin drive; 25" plunger stroke; 60" die space; 8" shaft
No. 1 BLISS; 6" Plunger Stroke

PRESSES—HORN

No. 24 BLISS CONS. B.G. & flwheel
No. 14 TOLEDO, B.G., No. 14½ TOLEDO
No. 16 BLISS, 2" Str., No. 42 TOLEDO
No. C-A-4 FERRACUTE, 4" Stroke

PRESSES OBI

Nos. 6, 5½, 5, & 4 CONSOLIDATEDS
No. 5½ WALSH, No. 4-S ROBINSON
NOS. 5, 4, 3, & 2½ TOLEDOS
No. 4 V & O BG., 7" Stroke
No. 103 V & O, 8" str.

PRESS BRAKES

OHL: 10'14 ga.; 6'7/32"; 4'16 ga.; 5'14 ga.; 66" 14 ga.
CHICAGO STEEL: 6'14 ga.; NEW NOS. 255 & 335 (with priority)
CINCINNATI—4' ¼"

PRESSES—MISCELLANEOUS

ARCH: No. 04 LEFFLER, 2" Stroke
No. 69 HOLDEN, 2½" Stroke
No. 406-A ADRIANCE, 5" Stroke, B.G.
OPEN BACK GAP FRAME: No. 75 CONSOLIDATED, B.G.; No. 7 PERKINS, 1½" Stroke
No. 6 R & K Style N, 4" Stroke, B.G.
No. 75 TOLEDO, 3" Stroke; 4" Shaft; M.D.
No. 76 TOLEDO, 3½" Stroke; No. 68 WOLF
No. 61 BLISS Reducing; B.G.

INTERSTAT

DELIVERY!

WOOD SCREW MACHINES

No. 2 for wood screws No. 8 to No. 20 length from ⅜" to 3½"
No. 3 for wood screws No. 12 to 30 length from ¾" to 6"

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NO. 8 WILLIAMS & WHITE, Cross head 15" high and 72" long; No. 2 Williams & White
RYERSON KLING DOUBLE END; 14' bed; B.D.
WALBURN-SWENSON; 12" stroke; Motor Dr.
NO. 4 LONG & ALSTATTER; 10" stroke

RADIAL DRILLS

3' FOSDICK; 6' FOSDICK & WESTERN

GRINDERS

DISC: No. 24 Gardner, 53" disc. B.D.
No. 3 WILMARTH & MORMAN, Table 8x24"
KNIFE: 84" PLYMOUTH & 61" SEYBOLD

GEAR MACHINERY

NO. 36S GOULD & EBERHARDT
NO. 6-A CINCINNATI, 72"x20"

HAMMERS

Standard Automatic Drop

3—No. 2—200 lb. 1—No. 4—400 lb.
1—No. 1—100 lb. 1—No. ½—50 lb.

Board Drop

800 lb. & 1000 lb. WILLIAMS & WHITE & BLISS

FLOOR LATHES

30 FT. PIT LATHE; FACE PLATE DIA. 156"; QUADRUPLE GEARED; INTERNAL FACE PLATE DRIVE

26/46"x20' SCHUMACHER & BOYE; DOUBLE SPINDLE; Back Geared
52"x22' FIFIELD; 30"x16' FIFIELD
28/48"x13' HARRINGTON Gap
26"x18' DRAPER
24"x15 FT. NEW HAVEN, LCG., Back geared
24"/44"x18 FT. McCABE DOUBLE SPINDLE
22"x10' AMERICAN, Gd. Hd.
21"x10' RYERSON-PHOENIX
14"x12' CARROLL JAMIESON
14"x6' BRADFORD; 15"x5' FLATHER
TURRET: 28" POND

NEW DIEHL No. 2

TIMKEN BEARING SPINDLES, 1" CAP. BAR FEED, M.D.

SPINNING LATHES

24" BLISS, NO. 6 BLISS 30" swing
No. 326 TOLEDO BB, 30" swing

MILLS

No. 45 PRODUCTOMATIC
No. 1 KNIGHT VERT.; No. 3 PRATT & WHITNEY DIE SINKER; BILTON CAM MILLER

SINGLE END PUNCHES

No. 2—HILLES & JONES Horiz. Cap. 1" thru 1"; I & A Beam Punch
ROCK RIVER Punch & Shear 14" thr.
No. 15 W. & W. 24" thr. arch. jaw

GANG PUNCHES

12' L. & A.; Wgt. 100,000 lbs.
NO. 2 LONG & ALLSTATTER, 74" bet. hsgs.
NO. 5 BERTSCH, 64" between housings
BERTSCH—51½" between housings; Motor Dr.
2—No. 10 WELLS, 1—34" between 1—73" bet.

ROLLER DIE MACHINES

5, 6, 7, 8 & 10 Spindle YODER

ROLLER LEVELERS

50" HILLES & JONES—54" McKAY
5' NILES, dia. rolls 6¼"

RIVETERS

STAKE & PUNCH: Rock River, 36" thr., B.D.
No. 6 WHITING; ⅝" rivet hot, 50" throat
PNEUMATIC: Hanna Deep Gap Jaw, 18" gap,

FRICTION SAWS

No. 2, 4 RYERSON, Power Feed

ROTARY SHEARS

No. 34M MARSHALLTOWN Lennox Bevel ¾"
No. 10 QUICKWORK; 60" throat 14 ga. cap.
No. 3 QUICKWORK; 36" throat 3/16" cap.
No. 2A QUICKWORK 10 ga. cap.

SHAPERS

24" AMERICAN, 12" VERT. SLOTTER
16" ROCKFORD, M.D.

PIPE THREADERS

12" STANDARD-WIELAND, Cap. 4"-12"
6" SAUNDERS, Landis Die Head

UPSETTER

3½" AJAX, Single geared; Steel Bed; 16" stroke; Weight approximately 48,000 lbs.

SHEARS

12'14 GA.; 10'14 GA.; 6'14 GA.
6x6x¾" LONG & ALLSTATTER ANGLE SHEAR
10 GA. NIAGARA CIRCLE SHEAR & FLANGER

ROLLS

6' NILES 3/16" cap.
5' HILLES & JONES, 4" Bottom Rolls, 5" Top
8' NIAGARA 20 GA., 8'14-16 GA.

MISCELLANEOUS

GANG SLITTERS: 72" YODER, 5" dia. shaft; 6" dia. cutters; M.D.
SCRAP BALER: GALLAND & HENNING HYD.; 60"x24"x18", with 30 HP motor, Hopper, Compressor, Pump and Tank
SEAMERS: No. 3 BLISS; No. 125 ADRIANCE
TAPPERS: Nos. 4 & 8 PNEUMATIC GATERMAN; No. 1 Garvin; ⅝" cap. Gaterman

Machinery Co., Inc.
49 W. PERSHING RD.. CHICAGO. ILL.

IN STOCK FOR IMMEDIATE SHIPMEN

AUTOMATICS

No. 24 New Britain 4 spdl. chucking machine
1—4 spdl.; 1" cap. Acme with threading attach. Collets, Pads, etc. Mtr. Dr.

BOLT THREADING MACHINES

2 spdl. 1" Cap. Landis
1 single spdl. 1½" Landis
2—1½" Acme

BORING MILLS—Horizontal

1—No. 21 Lucas Table Type, all geared speeds and feeds Vee Belt, Mtr. dr.

BORING MILLS—Vertical

1—24" Bullard Vertical Lathe side head mtr. dr.
48" Niles Bement & Pond Car Wheel Borer M.D.

DRILLS

2 and 4 spd. Henry & Wright
24" Barnes Camel Back M.D.
36" Cinc. Bickford sld. hd.
36" Aurora Sl. Hd.
4 Spd. Barnes No. 4 Taper, 82"x17" Tbl p.f. to spd. m.d.
1—16 spd. Baush M.D. oil grooved 54"x30" rect. head, No. 3 Morse Taper
4—Langelier Bench High Spd.
1—Demco S.S. High Speed
1—3½' Mueller Univ. Table, motor drive

FORGING HAMMERS

2-2000 lb. Morgan
1-1000 lb. Morgan

GEAR MACHINERY

60" G. & E. Automatic Gear Cutter
1—3-26" B&S Auto. gear Cut.

GRINDERS

Hardinge Precision Tool Room
14x72 Landis Pl.
12x36 Landis Pl.

LATHES

2-12x5 Cleveland G. Hd. Taper Attach.
16x8' Flather m.d.
17x10' South Bend C.P.D.
2—18x8' Morris, 3 step cone D.B.G.
4x60 Fitchburg low swing—new condition
42x26 Bement Triple geared
14x8' LeBlond Geared Mtr. dr. Taper Attach. quick change
16x10' Prentice 3 stepcone D. B.G. with taper attach.
20x8' Davis semi quick change hvy. duty 3 stepcone D.B.G.
16x10' Lodge & Shipley Grd. head AC dr. with taper att.

PLANERS

1—20x20x4' New Haven

TURRET LATHES

No. 1 Bardons and Oliver

MILLERS

1-No. 3½ Fox Plain
2-E4 Kellar Auto. Die sinkers AC Mt. dr. Timken bearing spindles
1—No. 2 Osterlein Pl. all grd. feeds with Index heads
1—No. 0 Steptoe Hand

PRESSES

1—Billings & Spencer Trimming Press No. 2½
2—No. 2 Standard O.B.I.
2—No. 18 Bliss O.B.I.
2—No. 19½ Bliss O.B.I.
4¾ Michigan O.B.I.
No. 5 Stiles & Parker geared
No. CG 14 Ferracute O.B.I. Automatic roll fd.
Robinson Tog. Press 125 Tons 75" between uprights, 15½" f to b, 3" stroke

PRESS BRAKES

10'x10 ga. George Ohl M. dr.
6'x10 ga. D & K Leaf Type md.

SHAPERS

20" Davis gear box m.d.
16" Steptoe C.P.D.

WELDERS

35 K.W. Thompson Spot. Ad 60 cycle

PIPE MACHINES

10" Cox
10" Bignall and Keeler M.
6" Stover M.D.
Acme & I. Bolt Thrd. Mac

SAWS

3" Burr Cold
No. 12 Higley Cold
8x8 Milford Draw cut He saw mtr. dr. Hydraulic li

MISCELLANEOUS

1"x96" Cap. Lennox Splitti Shear
3—Grant Spinners . . . . . .
3A High Speed Hammer
Morton Keyseater 4" cap.
No. 0-2-3 LaPointe Broaches
1—No. 1 Gray Nibbler Turr Type
Wells Wire Straightener a Cut-off
⅝"x18' Nilson Wire Straig ener and Cutoff

WOODWORKING MACHINER

Defiance single spdl. Borir Machine Mt. on spd.
Fay & Egan S. end Tenon
6-Swing Cut-off Saws
1-Automatic Glue Jointer
1-24" Oliver Jointer
1-No. 1 American Saw tab
1-Smith Treadle Dado Saw t
1-New Britain Chain Mortisi Machine
1-Friction feed Cut-off saw
1-Double end cut-off saw
2-No. 2½ American Dbl. Sp Shapers
Pettingell Saw Tenoning M
2-Crescent Univ. Woodwork

NESBITT MACHINERY CO

100 E. PRATT STREET, BALTIMORE, MI

EPENDABLE MACHINERY ★★ FALK—

GRINDERS—Cylindrical

120" LANDIS Self-Cont., otor drive
36" CIN. Pl., Arr. Motor dr.

ncinnati Surface Broach No. 5—54" Duplex with Swiv-el Table, new in 1937

ISC GRINDERS

ner No. 8—40" disc, 30" ng Wheel, B.B. Belt dr.
ner No. 4—20" Disc, 16" ng Wheel, B.B. Belt dr.
er No. 2—16" Disc, Dble. nd, Univ. Tables, Belt
ner No. 1—dbl. end Disc, " B.B. belt dr.
DNER No. 14, Ball Bear., uble opposed, 20" discs

SHAPERS & SLOTTERS

Smith & Mills Helical Grd.
HENDEY ,Frict. Dr. (5), 50 each
CIN. Geared, Crank, compl.
Steptoe B.G. Crank Shaper 20"x24" N-B-P SHAPER-LANER, motor drive
New Haven Slotter; 32"
sary Table
thodes combination Shaper & otter, belt drive
Davis Back Geared, Crank haper, Single Pulley Drive ru Quick Change Gear Box. ranged for Geared Mtr. Dr.

LATHES

25' PUTNAM trp. grd., 17' ctrs.; pl. chg. gr., scr. cut.
16' GREAVES-KLUSMAN, chg. gr.; Scr. Cut. 20" Ch.
16' REED light Pattern, Pl. ge. gear; 11" Centers. $750
Lodge & Shipley Q.C.G. te type
American, DBG., Q. C. American Q. C. G. Taper, D.
6' MONARCH cone dr. gk. ange; Draw in bar & Col-s, Chuck, etc.
Rockford, Q.C.G. Cone
4' DAVIS pl. change scr. eng. lathe; compl.: $225
4' LOGAN (NEW) Lathes; Brg. Spdl.: 4" Collet cap.; r. for motor dr.; pwr. cross d: $225 f.o.b. factory; pri-ty certificate required; ship-nt from stock
6" PRECISION BENCH ATHES—Hardinge, Sloan & ase and others
08" FITCHBURG LO-VING LATHE, SPD.
12' HAMILTON pl. change, e dr. chuck
4' P & W. TOOLMAKERS ATHE, Taper att.
16"x6' SOUTH BEND pl. chge., Screw Cut. Eng. Lathes (2)

MILLING MACHINES

Index No. 40H Universal Vert. Miller
CLEVELAND VERT. MILLERS No. 1, new

SUDDEN DELIVERIES

No. 12 Pratt & Whitney Lincoln Mill
No. 2 Pratt & Whitney Lincoln Production Mill
No. 12 P. & W. DUPLEX PRODUCTION MILL.

100 ton Ferracute No. FRG-103 Double Crank, Back Geared Press, 4" stroke 10" die height, belt drive. Weight 16,000 lb.

TURRET LATHES

3x36 J. & L., Double Spindle, fine cond.
Cleveland Model A, 2" sgl. spdl.
Gridley Model G, 9/16" 4-spdl.

RADIAL DRILLS

DRESES 4' Arm, Pl. Rad., c.dr.

DIE CASTING MACHINES 3—MADISON KIPP late mod., 10"x12", 12"x14", 12"x16"

PUNCH PRESSES

Nos. 18 & 19 Bliss O.B.I.
No. 19 Truesdale OBI.
No. 4 Adriance OBI.
Nos. 18C & 19C Bliss O.B.I.
No. 4 MICHIGAN OBI.
No. 20B BLISS OBI.
No. 6 Waterbury Backed Grd., Open Back
No. 73½ BLISS S.S. Pl. flywheel
No. 4 BLISS Back Flywheel Pl.
No. 2 BLISS Black Flywheel Pl.
No. 1—Bliss Back Flywheel Pl.
No. 3R—Marquette Grd., M.D.
No. 15N BLISS, arr. G.,M.D.(2)
No. 25N ELISS Grd., MD.; (3)
No. 1 BLISS S.S., Toggle Press
No. 1½ BLISS S.S. DBL. ACT. CAM PRESS
No. 41 TOLEDO HORN PRESS arr. Motor dr.
25 Ton Henry & Wright Hi-Sp. Press, dble. roll feeds
No. 103S BLISS GANG DIE PRESS; Roll feed
No. 4½ BLISS, three col. Forging Press with Taper Rolls
6 Ton General Flexible Press
12 Ton Fox Flexible Press
2000 lb. Massillon Steam drop Hammer
400 lb. Miner & Peck Belt drop, with Lifter
200 lb. Bliss Board drop ham.
50 lb. DuPont Blacksmith Hammer
15 lb. Bradley upright Strap Hammer
No. 30 BLISS ARCH PRESS, Plain
No. 25 NIAG. ARCH PRESS, Plain
No. 71 Waterbury Coin. Press 25 tons
No. 93D TOLEDO DBL. CRK. GRD. S.S. PRESS, Welded Frame
No. 75 Toledo Open Back Plain Flywheel Press
No. 16 Bliss Horn Press, 3" stroke, Motor Driven
No. 2 Niag. OBI; No. 0 V&O(3)
No. 3 American Can Co. OBI.
No. 53 Perkins Sprue Cutter
No. 2 Middleditch Sprue Cutter
No. 1—100 lb. Standard Auto. Drop Hammer
No. 702—BLISS TRIMMING PRESSES (2) Flat
No. 4 Waterbury open back, rigid bed, plain
520 Ton Southwark Hydraulic with Laurie Pump
SHERIDAN EMBOSSING PRESS, 24x36

AUTOMATIC CHUCKING MACHINES

2—No. 24 New Brit. 5 spindle
1—No. 23 New Brit. 5 spindle
1—J&L HARTNESS AUTO. CHK. LATHE; m.d. 6"x12"

GEAR CUTTERS

No. 2 WHITON SPUR GEAR CUTTER. Auto.
36" Gould & Eberhart, "Victoria Model" perfect Cond.
48" Gould & Eberhart, Mtr. Dr.; Complete; Perfect Cond.
No. 36B Gould & Eberhart, Spur and Bevel Gear Cut., Mtr. Dr.

HAMMOND 10 H.P. BUFFERS—8 months old Mtrs. in base, 3-60-220/440

PIPE MACHINES

18" Saunders Motor Driven
12" Merrill Motor Driven
6" Williams Motor Driven
4" Curtis Portable, M.D.
2" Landis Belt Driven—fine

PROFILERS

No. 3 Garvin Sgl., Spdl. B. Dr.

COILING MACHINES

No. 1 and No. 2 SLEEPER & HARTLEY BX CABLE COILING MACHINES ⅜ and ½" cap. Last used for Speedometer cable. Complete

KEYSEATER

No. 3¼ BAKER 72"x3" Cap., immediate delivery

ALK MACHINERY COMPANY 18 WARD STREET ROCHESTER, N.Y.

EMCO REBUIL

MILLING MACHINES

No. 1B Brown & Sharpe Plain, s.p.d.
No. 2B Milwaukee Plain Double Overarm
No. 2 Knight, s.p.d.
No. 1½ Cincinnati Plain, cone
No. 5 Becker Vertical
Gooley & Edlund Briggs Type
Pratt & Whitney Lincoln Type
6x14" Pratt & Whitney Thread
36"x36"x14' Bement Slab, m.d.
40" Ohio Tilted Rotary, m.d.

SHAPERS

20" Steptoe
24" Ohio
26" Walcott
32" Gould & Eberhardt
32" Morton Railroad Type Draw Cut, m.d.

TURRET LATHES AND SCREW MACHINES

No. 3A Warner & Swasey Universal, m.d.
No. 0 Brown & Sharpe Hand, cone
2¼x24" Jones & Lamson Geared Head, bar
3x36" Jones & Lamson, bar
3x36" Jones & Lamson, chucking (4)
2 spindle 3x36" Jones & Lamson, chucking (4)
Woods Tilted Turret, cone

AUTOMATICS

No. 33 New Britain, m.d.
⅜-½" Cleveland Model B, m.d.
⅜" Cleveland Model A
4 spindle ⅞" Cleveland Model M, m.d.
1¼" Cleveland Model C
1¼-½" Cleveland Model B
No. 6D Potter & Johnston Automatic for brake drum work

PLANERS

48"x48"x10' Putnam, 3 heads

AIR COMPRESSORS

Usaco, m.d., 25 cu. ft.
6x6" Curtis Twin Cylinder
7x7" Curtis Twin Cylinder
Air Hoists

ARBOR PRESSES

No. 24 Greenerd Power, m.d.
15 ton Lucas High Pattern, 60" height
15 ton Lucas High Pattern, 72" height

BOLT THREADING MACHINES

9/16" Landis 2 spindle, m.d.
1" Acme 2 spindle, belt
1" Acme 3 spindle, belt
1" Landis, belt
2" Landis, belt
2½" Acme, belt
No. 11-S Rickert-Shafer Auto. Threading Machine, m.d., 1" cap.
American Bolt Heading Machine, 1¼" cap.

BORING MILLS

24" Bullard New Era, m.d., side head
30" Colburn, 1 rail head, m.d.
42" Niles-Bement-Pond Car Wheel Borer, belt
48" Niles-Bement-Pond Car Wheel Borer, belt

BROACHING MACHINES

Cincinnati Mill Broach, md., new
No. 1, 2 J. N. LaPointe, belt
No. 2 LaPointe of Hudson, belt
No. 2 J. N. LaPointe, md.
No. 3 J. N. LaoPinte Double, belt

BALL BEARING DRILLS

Mason Bench Type (3)
Sigourney Bench Type (2)
Henry & Wright Class K, No 2
Avey No. 2
3 spindle Barr No. 1
4 spindle Fosdick, ¾" cap.
4 spindle Fosdick, No. 3 taper, p.f.
4 spindle Gardam No. 1
4 spindle Henry & Wright No. 2
4 spindle Kokomo
6 spindle Henry & Wright No. 2

MULTIPLE SPINDLE DRILLS

5 spindle Barnes All Geared-Self-Oil
No. 00S Garvin Duplex
No. 1 Pratt & Whitney 2 spindle Gu Barrel
D2 Fox Multiple Straight Line
No. 2, 3 Baush
No. 7D Moline 2 spindle Hole Hog
D11, 15HC, 26C Fox
No. 37 Natco

RADIAL DRILLS

2½' Avey Sensitive
3' American Sensitive
3' Carlton Sensitive
4' Hammond Jack Knife
5½' Niles Semi-Universal, cone
No. 1 W. F. & John Barnes Horizonta

UPRIGHT DRILLS

10", 20", 22", 22½", 26", 28", 42" W. F. & John Barnes
22" Barnes All Geared Self-Oiling
22", 24" Aurora
24" Hoefer
24" Rockford
25" Superior
32" Cincinnati Bickford
32" Prentice

GEAR CUTTERS & HOBBERS

No. 5A Lees-Bradner Gear Generator
No. 12 Barber-Colman Gear Hobber
16" Gould & Eberhardt
18" Gleason Straight Tooth Bevel G Generator
18" Gleason Bevel Gear Planer
30" Brainerd Gear Cutter
Gleason Spiral Bevel Gear Rougher
No. 1-26" Whiton Full Universal Sp Bevel
No. 3-26", 3-36", 3 Heavy, 4-36", 6-60", 6-72" Brown & Sharpe Auto. Gear Cutters
Cross Gear Tooth Rounder
No. 3-26" Cincinnati Gear Cutter

Partial listing only.

THE EASTER

1001 TENNESSEE AVENUE,

ACHINE TOOLS

PLAIN CYLINDRICAL GRINDERS
8" No. 14 Brown & Sharpe
4" Landis, m.d.
0" Queen City, m.d.
6" Landis Integral Cam, m.d.
6" Norton, m.d.
0" Norton, m.d.
2" Landis, m.d.
2" Norton, m.d.
6" Cincinnati, m.d.
6" Cincinnati, belt
6" Modern, belt
6" Modern, m.d.
2" Landis, belt
8" Modern, m.d.
0" Norton, m.d.
2" Cincinnati Automotive Parts, m.d.

GRINDERS
10 Bryant Internal
1 Fraser Lapper
Bridgeport Knife
6" Cincinnati Universal
2" Modern Universal
50, 55, 60 65 Heald Cylinder
4 Gardner Disc
6 Diamond Disc
20 Gardner Combination Disc and Roll
120 Gardner Combination Disc
olt Universal Tool
ason Cutter Grinder
ld & Eberhardt Gear Cutter Grinder
ford Wet Emery
ngfield Wet Emery
hell Eng. Co. type A1 Polishing
cinnati Valve Seat Grinder, 2 m.d.

HAMMERS
b. Bradley Rubber Cushioned Helve
b. Little Giant
lb. Bement Steam
lb. Bement-Miles Single Frame Steam
lb. Bement-Miles Single Frame Steam
lb. Niles-Bement-Pond S.F. Steam
lb. Bement-Miles S.F. Steam
engell Bumping, belt

ENGINE LATHES
raised to 28"x10' Reed
x12' Barker
x16' Reed
x8' Fay-Scott
x10' Pond
x12' Bradford
x13' Niles
x16' centers American 100 H.P. Input
er Lathe, with 100 H.P. D.C. variable
eed motor and 6 smaller motors,
eight 65,000 lbs.
x18' Niles
x8'6" Bridgeford
x10' Bridgeford
x10' Whitcomb-Blaisdell
x11' Chard
24"x16' Schumacher-Boye
30"x14' Hamilton

MANUFACTURING LATHES
9x12" Sundstrand Mfg.
16"x6' Rockford
18"x8' Chard
3½x36" Lo Swing
3x80" Lo Swing
11"x4' Wells Speed
12"x5' Sebastian Turning
15"x6' Automatic Threading Lathe
20"x8' American Turret
20" raised to 28"x10' American Plain Turning
30" Streit Pulley Turning
Niles-Bement-Pond Axle Lathe
No. 5 Niles-Bement-Pond Center Driving Car Wheel—new
Niles-Bement-Pond Quartering Machine—new

PIPE MACHINES
2" Bignall, belt
No. 2 Bignall & Keeler, m.d.
4" Bignall & Keeler with Landis Head
2" No. 70 Jarecki
4" Eaton, Cole & Burnham
4" Marrell
6" Oster
15" Cox

SHEET METAL MACHINERY
10' Bertsch, 3/16", m.d. Square Shear
8' Niagara, 18 ga. foot power
30" Bertsch, foot power
No. 3 Gray Rotary Metal Cutter
No. 34 Lennox Rotary Shear
Niagara Circle Shear, 18 ga. 13" throat
No. 25S 2x14 Quickwork Rotary Shear, ¼" cap.
McCabe Pneumatic Flanger, ½" cap.
No. 1, 2 Campbell Nibblers
Magee Sheet Metal Wiring & Edging
8' Niles Hand Flanger
10' Niles Hand Flanger
No. 10A Quickwork Double Seamer

PRESSES
D2 Ferracute S.A. Drawing
P2 Ferracute Stiles
No. 6 Waterbury-Farrel D.C.
S51 Ferracute D.C.
No. 268¼B Toledo D.C. Toggle Drawing, 29" stroke, weight 175,000 lbs.
No. 496D Toledo D.C. Toggle Drawing, 17" stroke, weight 160,000 lbs.
No. 0 Springfield Bench Type Straightng.
Metalwood Hydro-Pneumatic type B45
Metalwood Hydro-Pneumatic type B33
300 ton Caldwell Hydraulic Wheel Press
30 ton Lourie type BX

MISCELLANEOUS
17x21" Lentz Steam Engine, direct connected to 200 KVA Allis-Chalmers, 240 volts A.C. Generator

et us quote on your requirements.

ACHINERY CO.,
CINCINNATI, OHIO

IS THE TOOL YOU WANT HERE

BRAKES
4'x¼" Cincinnati Series 40-4 press brake with large lot of dies

BROACHES
Nos. 1 & 3 Lapointe
No. 3 American rack type
No. 3 J. N. Lapointe double
2 ton American vertical
No. 2 Standard broaching screw press

UPRIGHT DRILLS
20", 22", 25", 26" W. F. & J. Barnes
21" & 24" Cincinnati
21", 25" Superior
22" & 28' Aurora
26" Bickford
26" Hoefer

HEAVY DUTY DRILLS
22½" Barnes 4 spindle gang
24" Barnes, All Geared

GEAR MACHINERY
No. 18H G. & E. Auto Univ. Gear Hobber
No. 3 Barber Colman hobber
8"-10" No. 1 Lees Bradner Production hobber
14", No. 5A Lees Bradner hob.
26"x8" No. 3 Brown & Sharpe automatic
36"x6" G. & E. automatic spur
48"x10" No. 4 B. & S. auto.
National Tool Co. gear checker, Model B
2 spindle Lipe Chamferer
Pratt & Whitney worm grinder
15" Gleason bevel gear quencher

GRINDERS, MISC.
17"x36"-48" Norton hyd. crank pin. type B Model 184
18", No. 2 Gardner disc
18", Gardner semi-auto
24", No. 84 Gardner opposed
24" No. 8 Badger disc
24", No. 4 Gardner disc
53" Gard. Horiz. disc No. 24
10"x50 Norton cam
P. & W. worm or thread
No. 1 Sellers tool grinder
Gisholt Tool Grinder
24" Ingersoll tub type
16" Norton snagging
30" Ransom elec. snagging
2¼" Wil. & Morman drill
24" Ingersoll cutter grinder
Hutto honing machine
Nos. 50 & 60 Heald
Norton type 15 lapper
No. 575 Hawes polisher
14" Pratt & Whitney surface
20"x12"x50" Safety Emery Wheel Co., surface
Nos. 6 & 15A Bryant internals

HAMMERS
500 lb. Bradley helve
600 lb. Chambersburg b. d.
Nos. 1, 2M Pettingell bumping
Pettingell double unit, No. 2M

LATHES, MFG.
No. 16 Gisholt Simplimatics
1"x18" Pratt & Whitney auto.
9"x14" Porter Cable
10"x18" Adams "Short Cut"
13x6' Automatic threading
20"x8' Wickes 12 speed geared head Rapid Production
Melling camshaft 4 cyl. motor
Melling crankshaft 6 cyl. mtr.
No. 9 LeBlond Multi-cut

MILLERS, PRODUCTION & MISCELLANEOUS
No. 3C Lees Bradner thread
Nos. 1 & 1A Davis & Thompson drum
Nos. 10 & 45 Bilton Productomatic
Kempsmith, Fox Whitney, Superior hand mills
25"x25"x14' Ingersoll Slab
No. 7 Becker Brainard
No. 12 Brown & Sharpe

PLANERS
24"x24"x5' Gray
24"x24"x6' Woodward Powell

PUNCHES
¾"x¾" Rock River, 26" throat
1¼"x1" L. & A. 12" throat
1¼"x1" Cleveland horizontal
No. 54 Hendley & Whittemore comb. punch & shear

ROLLS
No. 1A Ajax taper forging
54" McKay sheet leveler
4"x3/16" Bay City roll

SAWS, METAL
6"x6" Toledo hack saw. New
6"x6" Racine hack saw
Grabo No. 2 metal saw table
4", No. 12B Higley cold saw
6", Nutter & Barnes-Greenfield Cold Saw
7", No. 14 Higley Cold Saw
2¼" No. 17 Racine Abras. c.o.

SHAPERS
36" Morton draw cut, pow rotary feed to head

SHEARS
18" Pels all steel beam she
No. 418 Toledo squaring
No. 0-15 Stanley Unishear
Newbold guillotine
Lewis Alligator
No. 1 Hilles & Jones Alliga

SHEET METAL TOOLS
4'x¼" Cincinnati press bra
Nos. 1 & 2M Pettingell bum ing hammers
⅜"x3' Shuster wire straig ener & cutter
¾"x5' Shuster wire straig ener & cutter
No. 3 RH Magee wiring m
No. 1B Campbell Nibbler

SLOTTER
12" Dill

SWAGER
No. 6 Langelier with feeder

THREADERS
½" Webster & Perks doubl
½" Acme double head
¾" Economy
1½" Geometric with 1" M chey die head
1", 2" & 2½" Landis singl
2" Acme
2" Landis 2 spindle pipe nipple threader
2"x2½" Landis 2 spindle
2" Rogaco pipe machine

UPSETTERS
2½" & 4" Ajax
1½" Acme
2" National
No. 1A Ajax forging rolls

WELDERS
12 KVA Am. Elec. Fusion spot
17 KVA Thompson Gib spo
20 KVA Agnew spot
20 KVA Taylor spot
20 KW National, 220 V.
20 KW Taylor Maestra por
23 KVA Winfield
150 KVA A.E.F. projection, multiple spot
375 KVA Fisher, press type
25 KW Winfield butt, 220
30 KVA Thomps. butt, 220
35 KW No. 60 Federal bu
65 KW Federal butt
150 KVA No. 35 Swift flash butt

Put your surplus machines to work! Please mail us your list.

"Keep'em flying"

MILES MACHINERY CO., SAGINAW, MICH

In Stock Immediate Delivery

AUTOMATICS
No. 55 National Acme
4¾" Cleveland Model A

BORING MILLS
Boring Mills 42" Bullard 2 Heads
Boring Mill, 3" Binsee Horizontal

GRINDERS
8"x18" Landis Self Contained
No. 3 Brown & Sharpe Univ.
Ott 8"x16" Cylindrical
Grinder, No. 3 W & M Surface
Grinder, 16"x48" Landis Crkshft. self-cont.

HOBBERS
Gear Hobbers, No. 12 Barber-Colman
Hobber 16 H.S. Gould & Eberhardt
No. 1 Lees-Bradner Production Hobber

LATHES
18"x8' Hendey q.c.g.
18x8 American q.c.g.
18x10 American q.c.g.
Lathes, 20x12 Lodge & Shipley Grd. Head Motor Drive
Lathe, 21"x10 LeBlond q.c.g.
Lathe, 25"x10 LeBlond Grd. Head
Lathe, 26"x16' Bridgeford q.c.g.
Lathe, 36"x14 Lodge & Shipley q.c.g.
Lathe, 4AC LeBlond Crankshaft

MILLING MACHINES
No. 1½ Cincinnati Plain
Cooley & Edlund Type A
34"x9' Newton Slab

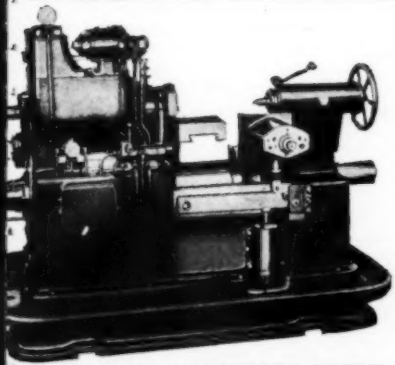
PRESSES
No. 90B Toledo Dble. Crank
No. 3 Verson O. B. I.
No. 3 L. & J. O.B.I.
No 4H Cleveland Horn
No. 23 Bliss Cons. Horn
No. 16 Bliss Horn
Drill Press, No. 23 Foote Burt

SCREW MACHINES
2—No. 1 Foster
2—No. 2 Foster
4—No. 3 Foster
1—No. 4 Foster

SHAPERS
Shapers, 28" Gould & Eberhardt S.P.D.
20" Cincinnati B.G. (2)
16" Whipp M.D.
16" Milwaukee B.G.

SHEARS
No. 960 Niagara ¼" cap. M.D.
14' Garrison ¼" cap. M.D.

MISCELLANEOUS
Broach, 2S LaPointe Hydraulic
Dieing Machine, 50 Ton Henry & Wright
Worm Generator, 24" National Hyd. M.D.
24" Fellows Gear Shaper



O. 17 BARNES AUTOMATIC LATHE

Swing—over front cross slide . . . 13", Swing—over rear cross slide . . . 17", Swing—over carriage bar . . . 26", Distance from tailstock center to face of spindle nose . . . 20", Speed Range (8 speeds) . . . 30 to 375 RPM, Feed range . . . 001" to .100", hole thru spindle . . . 1½", Spindle taper . . . 3½" per foot—3½" diameter, Height of spindle center from floor . . . 41", Travel—Front carriage (standard) . . . 8", Travel—Rear carriage (standard) . . . 6", Speed main drive shaft . . . 600 RPM, motor driven with 10 HP 3/60/440 motor, wt. approx. 6500 lbs., Our machine equipped with quick acting tailstock.

VICTOR Machinery Co.

130-132 South Clinton St., Chicago, Ill.

60" Niles Bement Pond Vertical Boring Mill—2 Heads—Motor Driven

42" Niles Bement Pond Vertical Boring Mill—2 Heads—Motor Driven

36"x36"x10' Niles Bement Pond Planer— 2 Side Heads—Box Table

No. 3 Hendey-Norton Universal Milling Machine—Complete

4' Niles Bement Pond Pl. Radial Drill

36"x14' Lodge & Davis Engine Lathe

42"x12' Gleason Engine Lathe

12"x36" Modern Plain Cyl. Grinder

½" Cleveland 5 Spdl. Auto. Screw Machine

⅝" Natl. Acme 4 Spdle. Automatics

***Inland* Machinery Company**
41 So. Clinton St. Chicago, Ill.

FOR SALE

Automatics: No. 53 Acme, 4-spdl., 1" cap.
No. 52 Acme, 4-spindle, ¾" capacity
2" Cleveland Model B
Drills: 5' Fosdick Radial, cone pulley, M.D.
No. ½ Avey toolroom, M.D.
Turret Lathes: 3¼x36" Acme, grd.-hd., ... pulley dr., cross-sliding Turret, bar feed with collets
24" Steinle, grd.-hd., V-belt dr., 6¼" hol... in spindle
Engine Lathes: 18"x10' Reed, pl. chge. gear
18"x10' Lodge & Shipley, quick chge. gear
Porter-Cable Production, grd.-hd., sgl. pulley drive (2)
Millers: No. 5 Blake & Johnson Vertical
No. 7 Becker Lincoln Type
Carter & Hakes Lincoln Type
Fox Hand
Presses: No. 5½ Walsh, solid back
No. 93½ Bliss, solid back
No. 1½ Bliss, O.B.I.
No. 1 R & K, solid back
No. 3 R & K, O.B.I.
No. 2 Bliss, O.B.I. M.D.
No. 10 Famco Kick—New
No. 12 Famco Kick—New
Grinders: No. 65 Heald Internal
No. 2 Reid Surface
Misc.: Single End Punch, ⅜" thru 3/16"
6"x6" Racine Power Hack Saw
No. 5 Marvel Hack Saw
Dusseldorfer Testing Machine, 2000 KG.
Oliver Die Filer
No. 1 Baker Keyseater
No. 3 LaPointe Broach

Turner Motor Drives For All Machines In Stock.

Allied Machinery Company
14 North Clinton St., Chicag...

60—72"x27' Niles Lathe
6A & 7A Potter-Johnston Turrets

DRILLS—24" Foote-Burt, 20" Worcester
GEAR CUTTERS—1—No. 5-60" B. & S.
No. 3-26" B. & S.
GRINDERS—No. 20 Bryant Int.
53" Gardner Disc
LATHES—1"x18" P & W. Auto.
3"x60" Lo Swing
3¼"x18' Barrett, gun boring

36"x18' Putnam Lathe Grd. Hd., M.D.
16"x72" Norton Crankpin Grinder

MILLERS—1—Hendey Lincoln Type, 1—No. 1 Garvin Hand, No. 2 Cinn. Plain

PRESSES—1—P-3 Ferracute

MISCELLANEOUS—1-1"x1" Punch & Shear Model A Cleveland ¾" Auto.
Portable Keyway Slotter, 4' Stroke
1—10"x10" & 6"x6" Marvel Hacksaws

T. R. WIGGLESWORTH MACHINERY CO., 1721 Superior Avenue, CLEVELAND, OHIO

MACHINE TOOLS FOR IMMEDIATE DELIVERY

MILLERS
No. 00 Brown & Sharpe
No. 3½ Fox
No. 4 Becker Vertical
No. 1 Brown & Sharpe plain
1—U. S. hand miller
No. 2 Garvin hand miller
1—Becker Lincoln Type

LATHES
18"x12' Monarch Q.C.
18"x8' Lodge & Shipley G. H. 12 sp.
18"x10' Lodge & Shipley taper attach.
16"x30"x12'x16' Fay & Scott gap
19"x8' Sidney M. D. heavy duty
16"x10' Monarch taper attach.

TURRET LATHES
2½" Jones & Lamson
2" Pratt & Whitney
1¼" Garvin
1" Foster

SHAPERS
20", 24" Smith & Mills M. D.
32" Cincinnati heavy duty
24"x40" Cincinnati Shaper Planer

GRINDERS
6"x32" Norton plain

CAPITOL MACHINERY EXCHANGE 1342 Atlantic Ave., Brooklyn, N. Y.

AUTOMATICS

1¼" Cleveland Model B

No. 34 New Britain Chucking

BORING MACHS.

3" bar Lucas Table Type with 24" Rotary Table

4-8" bar Niles, Knee Type M.D.

DRILLS, Radial

6' spin. Bausch No. 2 M.T.

6' spin. Henry & Wright Sensi.

5' Pond M.D. (3)

4' spin. Allen, Sensitive

1 spindle Sensitive

No. 11 Natco, 8 spin.

30" Prentice Sl. Hd., Gear Box

No. 13 P. & W. Multi

No. 13 Natco Multi.

Baker Type M, Tapping

GRINDERS

No. 2 Churchill Internal, can grind 30" deep, dist. of center of spindle to top of table 18", M.D.

No. 3 Cincinnati Centerless

20"x24" Norton Pl. M.D.

20"x96" Landis Cyl. M. D.

24"x 96" Landis Cyl. M. D.

No. 25A Heald 30" Rotary Surface, M.D.

30" x 240" Landis Roll M. D.

24" Blount Snagging

LATHES

20"x8' Lodge & Shipley, Q.C.G. Cone

28"x16' Pond, L. C. G.

30"x15' Putnam Axle M.D. Center Drive

36"/60"x15' Harrington, Sliding Bed Gap

42"x14' L. & S. Tri. Grd.

42"/22' Putnam, blocks to 52"

90" N.B.P. Heavy, Wheel

MILLERS

8" Lees Bradner Thread

Hall Planetary Thread Millers, Style D

No. 6 Jackson Vert. Miller or Die Sinker, M.D.

No. 4 Cinci. Vertical M.D.

PLANERS & SHAPERS

14" Steptoe Crank

26"x26"x8' Gray

24"x24"x8' Chandler, 1 hd.

60"x48"x14' Bertram, Openside, 3 hds., rev. M.D.

PUNCH & SHEARS

72" throat Cleveland Style G Punch S.E., Cap. 2"x1", M.D.

60" Cleveland EF Punch

54" H. & J. No. 4 S.E. Punch Capty. 1¼"1", M.D.

No. 4 H. & J. Dble. End P. S. 20" throats

No. 11 Schatz Triple Comb. Cast Steel Frame

Small Schatz Tri. Combn. Cast Steel Frame

No. 91, Size 11 Smith Armor Plate Tri. Combn. P. & S., coping attach., capty. punch ½"x½", 4"x3"x5/16" angles

SLOTTERS

16" Sellers

10" Betts, Cone or M.D.

TURRET LATHES

24" Ryerson Conradson Heavy Duty

MISCELLANEOUS

Bolt Threader, 1"—1½" Landis M.D. double hd.

Compressor, 179 cu. ft. M.D.

Core Box Machine, Crane

Cutting Off Machines, 6" cap. Williams M.D.

Dividing Head, 14" B. & S.

Dividing Head, 12" K. & T.

Furnace, Brass, 500 lb.

Furnace, Westinghouse Elec.

Gear Gen., 11" Gleason Bevel

Gear Cutter, 36" G. & E. Spur & Bevel

Gear Cutter, 60" Gould & Eberhardt

Gear Generator, 6" Gleason Bevel

Header, 1½" Acme Rivet

Hobber, 8" Hercules

Jarring Mach., Herman Jolt Mould

Keystr., No. 6 Catlin, 40" stroke up to 5" wide

Keystr., No. 1 Davis, 1" capty.

Keystr., No. 3 Baker, 26" stroke x 3" Keyways

Keystr., No. 4 M & M, M.D.

Lapper, Norton Type 1C

Magnetic Chuck, 24"x18" Walker on right angle plate

Pipe Mach., 12" Curtis & C.

Pipe Machs. 3" Stover M.D.

Press, No. 61 Spec. V. & O.

Rotary Table, 14" Kempsmith

Rotary Table, 28" diameter

Rotary Tables, 26" and 36"

Saw, 10" Espen Lucas Cold

Saw, 10" Nutter Barnes Cold

Saw, No. 2B Cochrane Bly 6"

Saw, No. 15 Lea Simplex

Testing Machine, 200,000 lb. Riehle

Thread Miller, No. 3 Lees Bradner for 8" shells

Vertical Attachs., K. & T. & Kempsmith

Wire Straightener, ¼" Shuster, 20'

BENNETT & RAFKIN CO.

Offices: 30 CHURCH ST., NEW YORK CITY

ANGLE PLATES & SURFACE PLATES

Our Plates are Manufactured of Selected Grey Iron Castings, Fully Seasoned — They Will Not Change. Absolutely Guaranteed.

(Machined ± .002 From Flat)

ANGLE PLATES

SIZE	NET PRICE EACH
4"x 4"x 4" (1 RIB)	$ 4.75
5"x 5"x 5" (1 RIB)	9.25
6"x 6"x 6" (1 RIB)	12.25
8"x 8"x 8" (2 RIBS)	19.25
8"x10"x12" (2 RIBS)	28.00
12"x12"x12" (2 RIBS)	39.50

SURFACE PLATES

Size	*Weight*	*Net Price Ground*
12"x12"	41 LBS.	$20.00
10"x15"	45 LBS.	18.00
12"x18"	60 LBS.	22.00

(WE CAN ALSO FURNISH HAND SCRAPED SURFACE PLATES)

Fast Delivery Guaranteed

Lafayette Tool & Supply Co., 178 Lafayette St., New York, N. Y.

Send for Literature on our other Products

AVAILABLE!!

REBUILT—Ready to Ship

2-10"x36" Landis Pl. Cyl. Grdrs., Self-cont.
12"x36" Modern Pl. Cyl. Grinder, Self-cont.
16"x36" Modern Pl. Cyl. Grinder, Self-cont.
12" Sellers Vertical Slotter—Motor drive
6 new 5HP U.S. Elec. Tool Co. Buffing Machines A1A required. Immediate shipment

LATHES

15"x8' Flather
24"x14' Reed—chuck
24"x16' Fitchburg H.D.
33"x14' Fifield H.D. S.B.G.—chuck, etc.
Vulcan Prod. M.D. Front & Rear Slides, cap. 5"x18"—Semi-auto.—never used
3½"x36" Lo Swing S.P.D.

MILLS

Model B Becker Vertical Rotary Mill—table 25" dia. M.D.
2—48" Oesterlein Offset Millers Fine cond. M.D.
3" Bar Miles Bement Horizontal Boring—Knee type
24" Bullard Type Vert. Boring and Turret
4" Bar Niles Horizontal Boring—Knee type 76" feed to bar
Newton Keyseating with vertical spindle
No. 1 Prentice Vertical, M.D.

MISCELLANEOUS

6' Vertical Boring Mill—1 head on rail—Home-made machine. Well built. Good for rough work
8" Betts Slotter—21" rotary table. Complete with lot of extras
4 spdl. Foote B. Gang Drill No. 5 M taper
2 new Vertical Honing Machines M.D.
No. 6 Bryant Internal Grinder
30" Morton Draw Cut Shaper
No. 24 Foote Burt H.D. Drill S.P.D.
21" Cincinnati Super Speed Drill M.D.
1, 2, spindle Leland & Gifford Drills
½" National Bent Tapper
16"x52" Landis Plain Grinder—self-cont.
3—7½HP Bridgeport Snagging Grinders
No. 13 Pratt & Whitney Profiler—one spdl.
8 ton American Vert. rack & pinion Broach
Hendey Single End Centering Machine
No. 2 Mitts & Merrill Keyseater
36" dia. Bellevue oil tempering furnace

Our Engineering Service will aid in the Selection of Good Used Production Machines Now Available.

R. A. VINE'S MACHINERY WAREHOUSE

652 West Willis Avenue **Detroit, Michigan**

HILL-CLARKE QUALITY

BROACHES

No. 4 J. N. LaPointe

DRILLS

No. 1—1 spdl. Leland-Gifford

1 spdl. Henry & Wright

2 spdl. Leland-Gifford Bench

2 spdl. Henry & Wright

4 spdl. Sigourney

4 spdl. Henry & Wright

4 spdl. Woodward & Rogers

6 spdl. Henry & Wright

No. 3 Baker 2 Spdl. Cyl. Borer

GEAR CUTTERS

No. 4—48" Brown & Sharpe

GRINDERS

(See Page 343 Hill-Clarke Cylindrical Grinders)

22"x96" Norton Plain, Motor Drive

No. 40 Bryant Wide Wheel, Oscillating

No. 18 Bryant Internal

No. 60 Heald Cylinder

No. 10 Lees-Bradner Spur Gear Grinder

1½" New Yankee Drill Grinder

MFG. LATHES

3½"x60" Fitchburg Lo Swing

No. 4AC LeBlond Auto. Crankshaft

LATHES

26"x10' Bridgeford Plain Turning

SLOTTER

10" Newton

MISCELLANEOUS

6" Saunders Pipe Machine

12" Bignall & Keeler Pipe Machine

60" Quickwork Rotary Shear

No. 4 Gaterman Pneumatic Tapper

HILL-CLARKE MACHINERY CO.

645 W. WASHINGTON BOULEVARD, CHICAGO

MOSER'S HIGH GRADE TOOLS

Miller, No. 2B Kearney & Trecker Plain
Grinder, Sanford Centerless
Grinder, 8"x24" W. & M. Surface
Grinder, 12"x24" Diamond Surface, M.D.
Grinder, No. 60 Heald Internal
Grinder, No. 65 Heald Internal
Grinder, Model 81, Type B 14"x36" Norton Crankshaft
Grinders, Ingersoll Tub (2)
Boring Mill, 36" Niles Vert. with turret head on rail
Turret Lathe, 26" Gisholt, 3¼" hole in spd.
Screw Machine, No. 1 Foster, A.C. & B.F., extra air chuck
Auto. Piston Turning Mach., No. 2P P & J
Radial Drills, American 3'-9" dia. col., quick change gear box (2)
Radial Drill, American 3' Sens., B.D.
Drill, No. 2—2-Spdl. Leland-Gifford
Drill, No. 10—16 Spdl. Bausch
Planer, 24"x6' Whitcomb-Blaisdell
Lathe, 9"x6' South Bend L.C.G.
Lathe, 16"x8' Lodge & Barker L.C.G.
Lathe, 18"x8' Springfield Q.C.G., T.A.
Lathe, 18"x10' Springfield A.G.H. T.A.
Lathe, 28"x12' Fay & Scott, L.C.G.
Press, 300 ton Wellman-Seaber-Morgan Tire
Press, 100 ton Hydraulic Press Co.
Keyseater, No. 2 Mitts & Merrill
Press Brake, 4'-6' Dreis & Krump
Tappers, Harvey Hubbell Horiz., B.D.
Tapper, ¼" Tuttle Vertical
Bolt Cutter, 1¼"
Squaring Shear, 36" Kutscheid Ft. Power
Riveter, No. 1A High Speed
Die Sinking Machines, Keller E-6 Mech. (3)

MOSER MACHINE TOOL SALES — 1608 W. Clybourn St., Milwaukee, Wis.

NEED GOOD TOOLS? — SEE US FIRST

D-31 Fox multiple drill, rectangular head, 16"x31½" spindle centers. No. 2 Morse taper; 10 spindles, hand and power feed to head.

DIES and MACHINES for rect. cans, inc. 61 Ams flanger; 72 Ams double seamer; 126CD Adriance double seamer; 281 Adriance gang slitter; No. 114 Adriance Automatic Double Seamer 10" round cans.

DRILLS, 2 Sp. Mason 10,000 R.P.M.; Detroit 5 Sp. Horizontal; No. 4 Quint six spindle turret drill; No. 4 Morse tapers

HAMMER, 60 lb. Bradley Helve

ENGINE LATHES, 20"x8 Reed D.C., Motor

MILLING MACHINES, No. 1 Newton slab, 65" table feed

PLANERS, 24"x6' Pond, one head

PIPE MACHINES, 3" Bignall & Keeler; 4" Saunders; both belt drive.

PRESSES, One No. 40 Bliss horn

SAND BLAST, Pangborn 30x38 Barrel

SEPARATOR, McKinzie chip production

WIRE STRAIGHTENER, ⅜" Wells 4 ft.

Many other tools—exceptional "buys"—write for full details.

A. D. White Mchy. Co., 108 N. Jefferson St., Chicago, Ill.

Established 1894

For Immediate Delivery

LATHES

16"x10' Hendey M.D., Q.C.
Prentice 18"x10' G.H.
21"x10' LeBlond G.H. Crankshaft
Prentice 38"x18' G.H.
42"x24' Putnam, triple geared engine lathe. Geared face plate drive, blocks up to 52'
52x16' New Haven, Heavy Duty QC.

TURRET LATHES

No. 9 Foster 3" Capacity
Gisholt 24", 3½" hole
1-5/16" Foster
1" Foster

GEAR CUTTERS

26" Brown & Sharpe
36" Fellows
G. E. 3x36 Spur
G. E.18" Spur & Bevel

AUTOMATICS

5A and 6A Potter & Johnston
Gridley 2¼
Gridley 3¼
Gridley Model G. ⅞ 4 Spindles
Cleveland 2¼" single spindle
Cleveland ⅞", four spindle, M.D.

MILLERS

No. 2 Brown & Sharpe Universal
Becker No. 6 Vertical
Becker No. 5 Vertical
Becker No. 2 Vertical
Brown & Sharpe No. 2 Vertical
6—No. 12 Brown & Sharpe Production Millers

GRINDERS

Cincinnati Tool & Cutter Grinder
16x54 Norton
Brown & Sharpe No. 16 11½"x72"
3—12x24 Cincinnati Univ. Grinders

SHAPERS

16" Kelly
16" Milwaukee, M.D.
14" Chase
16" Barker

RADIAL DRILLS

3½' Prentice
6' Prentice Geared Box M.D.
1—four spindle, ball bearing Allen Drill Press
1—six spindle, ball bearing Allen Drill Press
24" Snyder Sliding Head Drill Press
2—Foote Burt Heavy Duty Drills
1—24" Barnes Camel Back

VERTICAL BORING MILLS

44" Rogers Turret Head
Niles 36 M.D.
Niles 30
36" Car Wheel Boring Mill

MISCELLANEOUS

Oeking 4x4 Angles Punch & Shear
Binsee Horizontal Boring Mill
1000 lb. Chambersburg Steam or Air Hammer Single frame
No. 3 Lees Bradner Thread miller
2 Slotters 14"—16" Newton
No. 12 Pratt & Whitney Profiler

This is a partial list.

We buy and sell complete plants. *Send us your requirements.*

S. & S. MACHINERY CO.

207 Centre St., New York, New York

RECONSTRUCTION MACHINE TOOL CORP.

REBUILDING PLANT

424-432 BRYANT AVE., BRONX, N. Y. **DAyton 3-4246**

Office and showroom—199 CENTRE ST., NEW YORK, N. Y., WOrth 4-7960

We are equipped to REBUILD and MODERNIZE your old tools for today's tasks. Send us full details of your problems—we will be glad to have one of our engineers inspect your machines and submit a quotation—without obligation on your part.

WIRE, PHONE, WRITE

Partial listing—send us your inquiries — all machines can be rebuilt and motorized to your specifications.

PLANERS: BETTS 36"x36"x10' closed side
WOODWARD & POWELL 36" x 36" x 12' closed side
LATHES: J & L Hartness sliding head
LEBLOND 1¼" cap. engine lathe adapted for turret
LODGE & DAVIS 1¼" capacity
PUTNAM 24"x16'
LODGE & SHIPLEY 16"x10' geared head
FLATHER 16"x6'
DAVIS FURBER, H.D.
DRAPER 20" axel turning lathe
GRINDERS: No. 3 MODERN univ. cyl. (5)
14" PRATT & WHITNEY vert. surf. ball bearing
SHAPERS: 16" GOULD & EBERHARDT (2)
24" CINCINNATI, heavy duty

"MACHINES HARD TO FIND"

2-spdl. Demco H.S. Sensitive Drill, floor type
Rockford Single End Hydraulic Boring Unit with 2-sta. 54" dia. table
No. 60 NATCO 3-way Mult. Spdl. Drilling Mach., m.d.
No. 13 NATCO Mult. Spdl. 12x18 Hd. bored 16 spdls. with 8 spdls.
6' Prentice Radial, cone drive
6' Niles Plain Radial Drill
Gisholt Universal Tool Grinder
Slotting Attach. for No. 1 B. & S. Miller
2—⅜" Shuster Auto. Wire Straighteners
½" Shuster Auto. Wire Straightener

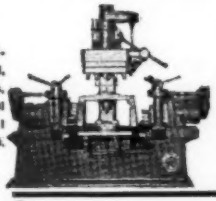
Your inquiries will be appreciated.

The Strong, Carlisle & Hammond Company

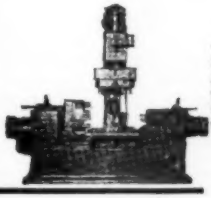
1392 West Third Street, CLEVELAND, OHIO

Branch Office: 2832 East Grand Blvd. DETROIT, MICHIGAN

Here's an opportunity to show American ingenuity. The following machines (all actual photos) were built for certain jobs. For example—one of these machines cost originally more than $8,000. We will sell it for $1,500. At this difference you can well afford to make the necessary changes in the tooling to meet your exact production requirements . . . and what is more important—*get immediate delivery!*

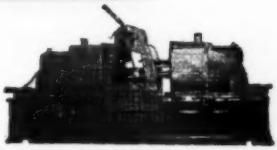


1—3 Way Leland-Gifford Multiple Drill, 2 horizontal heads, 1 vertical head; all power feeds; all heads individual M.D.

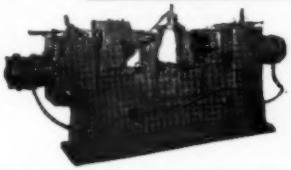


1—3 Way Leland-Gifford Multiple Drill & Tapper, 2 horizontal heads, 1 vertical head; all power feeds; all heads individual M.D.

1—2 Way Leland-Gifford Opposed Multiple Drill, power feeds, both heads individual M.D.

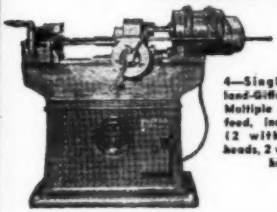


1—Greenlee Opposed Head Multiple Spindle Drill, all power feeds, both heads individual M.D.



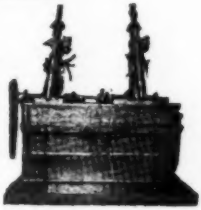
1—Leland-Gifford Opposed Head Multiple Drill & Tapper; all power feed; individual heads M.D.

1—Greenlee Single Head Horizontal Multiple Drill, with 30" diameter indexing table, individual M.D.



4—Single Head Leland-Gifford Horizontal Multiple Drills, power feed, individual M.D. (2 with 6 Spindle heads, 2 with 4 Spindle heads.)

1—2 Spindle 24" Barnes Camelback Drill, Spindle heads adjustable horizontally. Heads now set at angle. Can be arranged Back on rail. Arranged for M.D.



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4 spindle Woodward & Rogers
24" Superior
21" Mechanics Drill
3—20" Drills
3—14" Drills
6 spindle Allen Drill

GRINDERS

No. 11 Illinois Surface (new)
2—No. 20 Bryant Internal
No. 4 Gardner Disc

LATHES

20"x10' Perkins LCG
Fitchburg LoSwing lathe
LeBlond Double End 8" swing
17"x8' Hendey Lathe
Seneca Falls 10x4'
16"x6' Monarch
16"x4' Garvin
24"x6' Lodge & Davis

MILLS

Taft Peirce Thread Mill
Burke Bench Mill

PLANERS

Yager Wood Planer
26x26x8' Ames

PRESSES

PG 5 Ferracute
No. 101 Niagara Punch
Rousselle Punch Press

SAWS

30" Band Saw
36" Band Saw
5' Crescent Swing
6x6 Toledo Hack Saw
Delta Metal Cut. Band Saws

SHAPERS

2—8" Shape Rite (new)

TURRET LATHES

No. 5 Foster

MISCELLANEOUS

No. 1 LaPointe Broach
Hancock Flame Cutting Mach.
National Acme Stud Threader
3 Ton Crane
Waterbury Farrell Bolt Trim.
Waterbury Farrell D8SD Cold Header. Complete with pointer and drawing attach.
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30"x30"x8' New Haven, One head, belt drive

24"x24"x6' Cinc. Planer, Belt Drive

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No. 1 Schuchardt & Schutte Gear Hobbers

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18H Gould & Eberhardt Hobber

24" Rhenania Gear Hobbing Mach.

SHAPERS

16" Rockford Cone Drive

GRINDERS

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No. 55 Heald Internal Grinders

No. 60 Heald Internal

No. 70 Heald Internal Grinder

10"x36" Norton Plain Grinder

16"x72" Landis Plain Grinder, M.D.

14" Pratt & Whitney Ball Bearing Spindle, Vertical type

No. 5 Oliver Drill Grinder M.D.

MISCELLANEOUS

Quickwork Rotary Shear

No. 1 Klemm Metal Band Saw

Atkins Metal Cutting Back Saw

No. 1 Baker Keyseating Machine

2" Acme Bolt Cutter

No. 1 LaPointe Broaching Machine

2" Landis Pipe Threading Machine

20 spindle No. 2 M.T. Natco Drill

1" Roller Pipe Cutting Machine

Savage 3/16" Nibbler

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No. 55 Heald Internal
No. 60 Heald Internal
No. 24-53" Gardner Disc

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No. 6A Potter & Johnston, g.h.
No. 3 Foster, g.h., Timken bearing
2½"x11" Acme, c.d.
2¼"x24" Jones & Lamson, g.h.
3"x36" Jones & Lamson, g.h.

MILLS—Plain

No. 3 Cincinnati, c.d.
No. 8 S Becker Duplex, c.d.

MISCELLANEOUS

No. 3E Lees-Bradner Thread Miller, Collet Type
⅜"x6' Pyramid Type Roll
⅝"x18' Nilson Wire Straightener
Wicaco Oil Groover
2" Pratt & Whit. Duplex Spline Mill

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No. 4 Colburn 24" Mfg. No. 5
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No. 55 Heald Cylinder
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No. 3 B&S Univ. Grinder

MILLING MACHINES

No. 2 Becker Vert.

MISCELLANEOUS

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Die Filer, No. 5 Thiel, m.d.
Planer, 36x36x12' W & P. 2
Plate rolls, 10' Long, 6" dia.
Press, No. 1 Bliss Cam, Fly
Presses, No. 50 Wat. Far. OBI
Punch, No. 3 L & A Geared 6" Throat
Press, No. 3 Bliss Stiles, Grd.
Press, Mod. B-45 Metalwood Hydraulic
Riv. Hmrs. Nos. 1½B, 3A H.D., 4A Mtr. Dr. & 5A High Speed
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Heald No. 70 Internal
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Fifield 30"x27'
Fifield 32"x25'
Lo-Swing 4"x108"
Niles 27"x14'
Niles 28"x11'
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1—No. 2A Warner & Swasey Universal Hollow Hexagon Turret Lathe, motor drive, all geared head, all power feeds, for bar work. Serial No. 69548
1—24" swing Gisholt Saddle Type Turret Lathe; 2-step cone dr.; back geared; all power feeds to hexagon turret and to cross slide; hole through spindle 6¼"
4—2x24" Jones & Lamson Turret Lathes; all geared head; single pulley drive; cross sliding headstock; power feeds. Two machines arranged for chucking work and two machines arranged for bar work
2—3x36" Jones & Lamson Turret Lathes; all geared head; single pulley drive; cross sliding headstock. Arranged for chucking work

MULTIPLE SPINDLE AUTOMATIC CHUCKING MACHINES

1—No. 22 Prentice (New Britain) Multiple spindle automatic chucking machine, belt drive, with four spindles and five chucking positions
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1—42"x42"x12' Niles Bement Pond Double Housing Planer; with two heads on the cross rail and with one side head. Belt drive

MISCELLANEOUS

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Miller, Ohio 48" production
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Presses, Horn., Toledo No. 13
Press, Toledo 90-E straight side 42" between uprights M.D.
Press, Flexible 3-ton power
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Williams & White No. 13 Single End Punch, 36", gd.
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Gisholt Crankshaft Balancing Machine
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Follows No. 4-T Thread Generator
Taylor-Winfield Butt Welder
Gear Hobber, Adams No. 1 (3)
Gear Tooth Rounder, National Red Ring, M.D.

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Flex. shaft, RA 5 Haskins
Flex. shaft, Sioux No. 1120
Elec., 7" Black & Decker, on stand
Emery, Webster & Perks 16"
Emery, DE, Norton 24"
Emery, DE St. Louis 18"&20"
Wet tool, Springfield, 27" wheel

LATHES:
26"x14' Niles, PCG
14"x6' Rumsey, PCG
10"x42" & 10"x48" Atlas, bench type and motors

PRESSES:
Arbor, Famco and Atlas.
Arch, Bliss 30-A Grd., M.D.
Foot, Famco and No. 4 Swaine
O.B.I., No. 3A Willard
O.B.I., No. 19 Bliss
Punch, No. 5 Bliss Stiles Grd.

PUNCHES & SHEARS:
Rock River L, 24" thr. ½ in ½"
DE 1-10 Badger ½ in ½", 10" thr.
No. 4 L & A, Multiple, 30" betw. housings, 6" cap.

SAWS:
Hack, No. 14 Atkins 6x6"
Wells No. 5 & 8, Band, Metal new
Delta 14" No. 881-C band metal saw

SHAPERS:
26" Hendy planer type dr.
7" No. 7B Atlas

SHEARS:
Dbl. action, No. 11 Excelsior, inside cutting, cap. 12 ga.
Rotary Bevel, Lennox ¼"
Slitting, Rotary Niag., cap. ¼" Throat 60"
Square, 36"x18 ga. Pexto Foot New (3)
Square, 30"x18 ga. Ditto
Throatless, 18 H Marshalltown

THREADERS, Pipe & Bolt:
No. 402 Oster Power Boy, 2" cap.
Roller Cut-off, No. 1 Oster, 2"
Pipe, 2" Oster No. 302

MISCELLANEOUS:
Blowers, No. 1, 2, 3, 4 Champion
Chucks, 12", 14", 18" L-W 4 jaw
Compressors, Ingersoll-Rand 2½-3"; Hobart 2 x 2½"; Quincy 2½x2½"; All with tanks and motors
Gear Cutter, No. 4 B. & S.
Hammer, riveting, No. 5A High Speed
Jacks, Lever Lift, 15 ton Joyce Gridland; Simplex; 10-ton Barrett
Lockformer, Cap. 24 ga., & mfg
Miller, bench, MF-G Atlas
Roll, Corrugating, 10" Robinson
Tapper, No. 6 St. Louis
Valve Refacer, ½" Black & Decker
Welders 2½, 5, 7½, 10 K W Dyer spot

Brown Mchy. Co., 2333 N. Ninth St., St. Louis, Mo.

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AUTOMATICS
1¼" Cone Forming & Cut.-Off Mch.
Cleveland Sgl. Spdl. (2) 2"
⅞" Sgl. Spdl. Cleveland
DRILLS
4"x36" Sundstrand Dbl. End Centering Machine
6 Spdl. Aveymatic, No. 2 M. T.
Sgl. Spdl. Aveymatic, No. 3 M. T.
Avey 4 Spdl. Sens.
Davenport Dbl. Hd. 10 Spdl.
GRINDERS
No. 8 Badger M.D. Disc, dbl. end. Oscillating Tables
Gardner Semi-Automatic, 18" disc Sgl. end & rotary fixture
No. 25 Heald Special Piston Ring
No. 22 Heald Rotary Surface Gr.
12"x36" P & W Vert. Surface
NOTICE THESE LATHES ! ! !
36"x24' Putnam Grd. Hd.
30"x18' Houston-Stanwood-G. G. H.
10"x60" Davis Machinists Lathe
24"x48"x14' McCabe 2 Spdl. Lathe
With riser blocks swings 60"
TURRET LATHE
2¼"x24" J & L Flat Turret
MILLS
No. 2 Craftsman Cont. Rotary
Bilton No. 50
MISCELLANEOUS
V40, V18 American Broaches
1½" LANDIS DBL. HD. BOLT THREADER
Boiler & Electrole Oil Burner
H. R. Kreuger Vert. Mult. Revolving & Drilling Machine
Hammond Horiz. ditto
36" Quickwork, Pettingell Hammers
Cleveland Pointer
12 ROLL CONTINUOUS ROLLING MACH.
Dings Mag. Chip Separator
Webster & Perks 5 Spdl. Tapper
Kent ½" Stud Threader
Peerless 14" Power Hack Saw
ACME 2" ALL STEEL HOT UPSETTER
PLANER
30"x30"x8' Flather Planer
2 heads on rail. M.D.
SHAPER
24" Gould & Eberhardt
SHEARS
MESTA 48" GATE SHEAR
For hot shearing 4"x30"
Forged or rolled steel slabs
Will cut squares 4½"x4½"
WRITE FOR FULL PARTICULARS
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Oeking Comb. Punch & Shear
Pettingell No. 14 Sheet Mtl. Rotary
No. 2 Ryerson-Len. Thrtless. Bevel

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Drills: Bausch S Spdl., 33" Dia., 1¾" cap.
Natco 12 Spindle 18" dia., 1¼" cap.
Bausch 12 Spdl., 36" diameter, 1¼" cap.
Barnes 24" Sliding Head

Lathes: J & L 3"x36" Turret, Double Spindle for Chucking
Prentice 16"x12' Cone, B.G. T.A.
LeBlond 24"x10' Cone, B.G. T.A.
N.B.P. 28x10 Cone D.B.G.

Grinders: Landis 10"x52" Plain, S/C C.S.
Landis 16"x66" Plain C/S.
Heald No. 65 Internal

Press Brake: D & K No. 333—4' 10 Ga. Capacity, M.D.

Press Brake: D & K No. 333, 48" 10 Ga. Var. Speed, M.D.

Punches: Kling No. 7 Single End, 60" Throat, cap. 1¼ through 1" angle shearing attach.
Niagara No. 135—18" throat, cap. ⅜ thru ¾

Presses: V & O No. 2½ O.B.I. 3" stroke, M.D. (6)
Toledo No. 51 Arch
Bliss No. 22 Horn, M.D.

Miscellaneous: Putnam Double Spindle Profiler
Foote Burt Vert. Honing Machine
Niles 16" Slotter, 30" table
Grant No. 81 Rivet Spinner M.D.

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40" x 20' HOUSTON, STANWOOD GAMBLE LATHE, Heavy-Duty Q.C.G., Taper & Equipment.

18"x14' Hendey Lathe, Q. C. G.

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30"x30"x8' CINCINNATI and PONI Planers.

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DRILLS
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24" and 28" sliding head, back gear, power feed.
17" and 14" Delta, new.
Ceiling suspended, drilling area unlimited.
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59 other drills of various sizes and types.

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6" and 10" ATLAS new.
10" Clausing new.
18"x8' Champion, quick change gears.
18"x10' Barnes, loose change gear, two chuck.
12"x6' Seneca Falls, floor type.
Lathe, 28"x20', 6" Rahn Carpenter, with rais. block

MISCELLANEOUS
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Grinders, Bryant deep hole chucking.
Broaching Machines, No. 1 and No. 3 LaPointe.
Milling machine, No 2 Becker, vertical.
Milling Machine, 20"x20"x8' Ingersoll Slab, m. d.
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MOTORS, REBUILT 3 Phase ½ to 50 HP various speed

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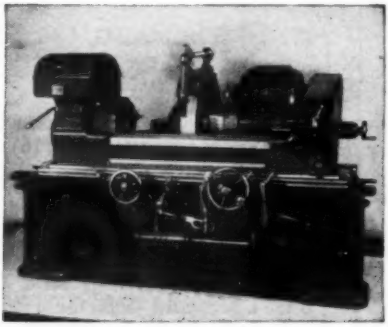

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10'x18'	14'x36'
10'x36'	14'x50'
10'x50'	16'x50'
10'x72'	16'x72'

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IMMEDIATE DELIVERY

6'x6' RACINE HACK SAW, M. D.
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16' PUTNAM SLOTTER, M. D.
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BRIDGEFORD CENT. DR. AXLE LATHE (will take 12'x8' Axles)

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1—24x14' American Lathe, 3 Step Cone, Double Back Geared
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1—6x6 Peerless Universal Shaping Saw, Motor Drive
1—Keller Automatic Engraving Machine, Two Routing Spindles

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National Red Ring Model G-CC-8'
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Excellent Condition

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7/8" Gridleys, Mod. G, 4 sp. with thread. att., arr. M.D., Serial Nos. in 16000 (16)

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2¼" Cleveland, S.S., belt drive

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8x12 Van Norman, M.D.
12x36 Cinc. Univ. Cylindrical S.C. Complete
18x60 Landis Univ. Cyl. Complete C/S.
No. 55 Heald Int., Complete
No. 6 Gardner Disc Univ.

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15x6 Bradford T.A.
16x8 Carroll-Jamieson
16x8 American
16x8 Lodge & Shipley
20x15 Boye-Emmes T.A. M.D.

MILLING MACHINES

No. 0 Kempsmith M.D.
No. 0 Chicago with Vert. At.
No. 3½ Fox Plain P.F.
No. 2 Trautman, Divid. Hds.
Becker, Prod. Type 56"x12"

MISCELLANEOUS

Brake 5' D&K 14 ga. cap.
6" Victor Pipe Mach., Dies
Punch & Shear No. 53 Beloit
24 Spindle P. & W. Mult. Drill No. 1 taper M.D.
No. 52 Acme 4 Spdl. Auto. ⅝" cap. Threading Spdl.

No. 12 Pratt & Whitney Profiler—two spindle

14" Springfield Shaper Complete
16" Barker Shaper, M.D.
16" Kelley Shaper, B.G.
Shears (2) 30" Power
Trucks Box type 22½"x22½" x24" deep—cheap
Hammers, Hi Sp. 3, 4, 5A
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STRAIGHT BEVEL
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CAPACITY: Spur Gears to 144' Dia. x 16' Face, Bevel Gears to 100' Dia. x 16' Face, Internal Gears to 96' Dia. x 16' Face.

Motor Driven with 220 Volt, D. C., 1000 to 1800 R.P.M. Motor. With Standard Equipment and Large Assortment of Cutting Tools.

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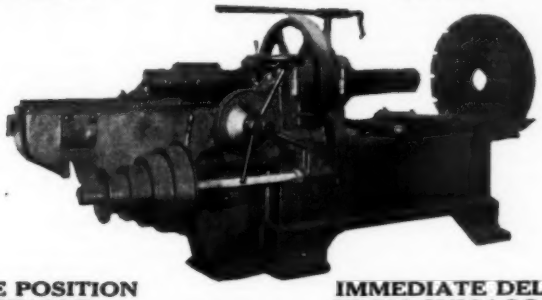
6" CYLINDER BORING MACHINE

POWER FEED TO 6' BAR...

NO. 6 M. T. IN SPINDLE



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32" BAUSH VERT. BORING MILL
3¼" Gridley Single Spindle Autp.
10"x36" Landis Pl. Grdr., self-cont.
No. 6A Potter & J. Auto. Chucker
84" Vert. Boring Mill
18"x10' Whitcomb Blaisdell Lathe, geared head, T.A.
No. 12 Barber-Col. Gear Hob., M.D.
3" Bement Dougherty Hor. Bor. Ml.
12" Pratt & Whitney Vert. Sur. Gdr.
No. 24—Gardner—53" Disc. Grinder
⅝"-⅞" Model B Cleveland, Auto.
No. 1 Adams Farwell Univ. Gear Hb.
Barber-Colman Spur gear hobber, double over-arm
6¼" CLEVELAND MODEL A AUTOMATIC
3"x36" Jones & Lamson Turret Lathe, cross-sliding head, s.p.d.
8" Gleason Bevel Gr. Generators, (2)
Eight Spdle. Baush Drill, No. 2 M.T.
20" G. & E. Crank Shaper
24" Kelly Crank Shaper
Putnam Prod. Miller, quick ret., MD.
18"x8' Advance Engine Lathe
3-⅝" Barrett Horizontal Boring Bar
9"x9" Peerless Hacksaw
32"x15' Pond HD Lathe
32" Smith & Mills Shaper, M.D.
9"x12" Porter-Cable Production Lathe, M.D.

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We Specialize In

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ROCKFORD No. 2 Horiz. Boring Mill—floor type—M.D.
G. & E. 48" Gear Cutter
WHITON No. 15 Auto. Gear Cutter
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GLEASON 37" Bevel Gear Planer
GLEASON 10" Spiral Bevel Gear Gen.
GLEASON 6"-11"-18" Bevel Gear Gens.
LEES BRADNER No. 5A Gear Generator
LANDIS 3½" Internal Hyd. Race Grinder
LANDIS 16"x36" Plain Cyl. Grinder—M.D.
NORTON 14"x50" Plain Grinder—M.D.
HEALD No. 60 Internal Grinder
NORTON 16"x50" Crankshaft Grdr.—M.D.
GARDNER No. 6 Dbl. End BB Disc Grinder
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FELLOWS No. 4T Thread Generator
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BRIDGEFORD 27"x10' Boring Lathe
MONARCH 16"x10' Geared Head Lathe
FOOTE BURT No. 3 Rail Drill
P. & W. No. 12 Multi-Spindle Drill
NATCO C-13 Hyd. Multiple Spindle Drill
NATCO C-11C Multiple Spindle Drill
BLISS No. 31 Power Press
N.B.P. 400 ton Hyd. Wheel Press
ESPEN LUCAS No. 138 Cold Saw—Cap. 12" Round
NEWTON No. 197 & No. 200 Cold Saws
COCHRANE & BLY No. 5 Cold Saw
COULTER 2 spindle Diamond Borer—M.D.
LANDIS 4" Single Head Bolt Cutter
GRAY 30"x30"x8' Planer — 2 heads on cross rail—M.D.
ACME 1" All Steel Upsetter
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TREADWELL 12" Pipe Machine
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ANDERSON Power Scraper
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Cleveland, Model A, 1¼, 2 3¼"
Cleveland, Model M, 4½" 4 Spdle. Chker.
New Britain, No. 22, 23 and 24
Automatic Threading Lathes, 13"x6' G.H.
Gridley, 2¼, 3¼ & 4¼" S.S.

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Henry & Wright, 1 to 8 Spdl., No. 2 mt.

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Fellows 36"

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LAPPERS
26" Bethel Player

LATHES
Lodge & Shipley 16"x8 & 8'
Jones & Lamson, 3x36 Dble. Spdle.

MILLS
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PRESSES
No. 94 Bliss, Solid Back
No. P 3 & 4, & P G 2 Fer., Solid Back
No. 34 Toledo Solid Back, Geared

PLANERS
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TAPPERS
No. 1, 2 & 2X Garvin
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5 Spdl. Webster & Perks Vertical

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orton No. 2 Univ. Tool & Cutter (Eqpt.)
incinnati No. 2 Univ. (12"x36") Cyl.
'x12" Greenfield Cylindrical Hydraulic Feed, Equipped
ack & Decker 5 H.P. Hv. Duty 48" Between 14"x2½" Wheels

LATHES

dney 18"x8" Q.C.
"x6' Sebastian, All Geared Hd.
"x8' Lodge & Shipley (Patent Head) Q.C.
"x8' Sidney Q.C. (Hv. Duty—Double Back Grd.)
"x8' Mueller Q.C. Double Back Geared
"x8' Chard Semi—Q.C. Double Back Geared

SHAPERS

' Rhodes, Vise & Countershaft

MILLS

cker No. 3 Vertical
incinnati No. 3 Plain, Back Geared
aylor & Fenn Vertical, 8" Overhang S.P.D.
rown & Sharpe No. 1½ Universal

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isholt 14" & 24"
/ARNER & SWASEY 3A UNIVERSAL, ALL GEARED HD. ALL PWR. FDS. TO TURRET & SLIDE, 3½" HOLE IN SPDL.
/ARNER & SWASEY (NO. 2 SPECIAL) 2¼" CAP. AUTO. CHUCK, PWR. FD. TO TUR.
ISHOLT 21" GEAR BOX MOTOR DRIVE (COMPLETE) LATER TYPE 2 STEP CONE MACHINE

DRILLS

½' Pond Radial
LLEN 4 SPINDLE No. 2 M.T. POWER FD. ALL SPDLS.

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ACME NO. 52 ¾" 4 SPDL. (REBUILT) M.D. (2)
BROWN & SHARPE OOG (REBUILT)
GRIDLEY ¾" 4 SPDL. MOD. F COMPL.
GRIDLEY 4 SPDL., 1⅜" MOD. F (2) MD.
GRIDLEY 4 SPDL., ¾" MOD. F MOTOR DRIVEN, COMPLETELY EQUIPPED
CONE 4 SPINDLE 1¼"
CLEVELAND MOD. M. 4 SPDL. 1-1/16" CAP. STANDARD MOTOR DRIVEN MACHINE
CLEVELAND: ⅝", ¾", 1¼" MOD. B., ALL DOUBLE SLIDE. ALSO 1¼", 16" FEED, SHAFT MACHINE
NEW BRITAIN 6 SPINDLE 1" CAP.

L & G 2 spdl., pwr. feed, No. 2 M.T.
32" Snyder Geared Dr., No. 5 M.T.

MISCELLANEOUS

BROWN & SHARPE 3"x36" AUTO. GEAR CUTTER
Bradley Compact Hammer, 125 lb.
NO. 2 DAVIS KEYSEATER
Waterbury F. Arch Press, Geared 8" strk.
Oil Extractors—½ Bu.
DO-ALL SAW MOD. C.S. 12" THROAT, 4" CAP IN STEEL
Klemm No. 2 Cut-Off Saw
Reynolds Auto. Screw Driver
Peerless Hack Saw—6"x6" M.D.
Schuster Wire Straightener 3 Ft. Length, 3/16" Cap.
WHITON CENTERING MACHINE

SCOTT

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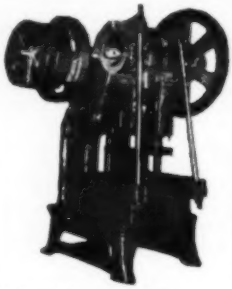
OLT CUTTER, 1" & 1¼" ACME dbl. spdl.
ORING MILL, 48" Bickford, b.d., 2 heads
UFFER, 6 HP Van Dorn, 3 phase 72" spdl.
RILL, 22" Prentice, slid. hd., belt No. 4M.T.
RINDER, 20"x144" Landis, plain cylindrical
RINDER, 12"x36" Pratt & Whitney Vertical Surface with magnetic chuck
RINDER, No. 1 Gardner, face, table 10"x 30", cup wheel 20"
RINDER, No. 6 Bryant inter. chkg., m.dr.
ATHE, 20"x8' Monarch, b.dr., q. c. chuck
ATHE, 20"x8' Hendey, belt dr., q.c. t. at.
ATHE, 22"x10' LeBlond, prod. type, belt
ATHE, 26"-50"x18' McCabe 2 spindle, belt
LATHE, 40"x26' Fitchburg, belt dr., D.B.G., plain change
LATHE, 50"x16' Baker, belt dr., pl. change
MILLER, No. 8 Becker Duplex, table 40x11
MILLER, No. 18 Kempsmith pl. belt, table 50"x13"
MILLER, No. 1 Standard, hand, motor, vertical and slotting
PIPE MACHINE, ⅛"-2" Landis, belt drive
PIPE MACHINE, 2½"-8" Williams, motor dr.
PLANER, 24"x24"x6' Pond, 1 hd., belt drive
PLANER, 24"x24"x6' Wheeler, b. dr., 1 hd.
SHAPER, 16" Smith & Mills, b.g., belt drive
SHAPER, 24" Cincinnati, belt dr., vise & countershaft

THE O'BRIEN MACHINERY CO., 113 N. Third St., PHILADELPHIA, PA.



No. 77 Toledo geared punch press. Approx. 75 to 85 tons. Bed area 26"x36". Stroke 2½". Shut height 15"; Approx. weight 12,000 lbs.

PROMPT DELIVERY

1¼ Cleveland Model A single spindle automatic screw machine.

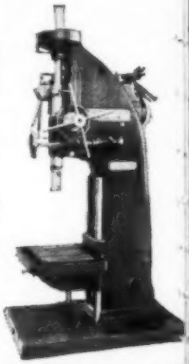
3½ Fosdick and Holloway cone drive radial drill.

Leland Gifford 2 way horizontal drill, power feed to spindle, No. 2 M.T.

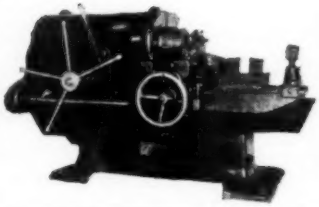
19" by 7' LeBlond production lathe, cone drive for 5" belt, wide ways.

No. 2 Cochrane Bly die filer, m.d.

6" Campbell Nibbler.



No. 314 Baker Heavy duty d press, 3" in steel, S. P. D.



4" Bardons and Oliver gea head cut off machine. Arran for motor drive, with base, 5 hole thru spindle, power f to cut-off.

SURPLUS STOCK AND MACHINERY COMPANY

620 W. Lake St., Chicago

HYDRAULIC PRESS

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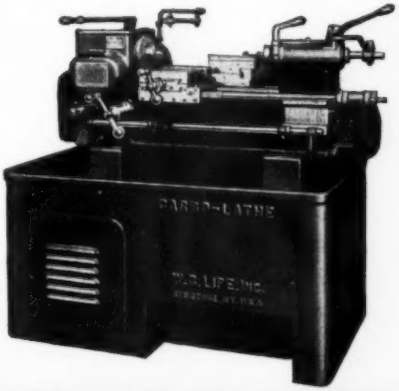

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